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(21)Application number : 09-200867 (71)Applicant : SONY CORP

(22)Date of filing : 10.07.1997 (72)Inventor : AOTAKE SHIYUUSUKE

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(54) APPARATUS AND METHOD FOR RECORDING AND REPRODUCING AS WELL AS RECORDING MEDIUM

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain an apparatus and a method in which a scene missed during a picture recording operation can be seen immediately.

SOLUTION: In an encoder board 213, an MPEG system stream obtained by MPEG-encoding an image (and a voice accompanying it) is retrieved on an MPEG file which constitutes a 'tape' as a recording region which is created in advance on a hard disk 212. On the other hand, in a decoder 201A which is realized when a microprocessor 201 executes a application program performing an MPEG decoding operation, data is read out from an arbitrary position in a range (a painted part) in which the MPEG system stream in the MPEG file is recorded, and it is decoded. The MPEG file is opened

by a so- called shared operation which permits an access operation from a plurality of application programs.

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2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] A record means to be the record regenerative apparatus which performs informational record and playback, and to record said information on an information record medium, It is the record regenerative apparatus characterized by reproducing said information already recorded on the information record medium from the location of arbitration while it has a playback means to reproduce the information recorded on said information record medium and, as for said playback means, said record means is recording information on said information record medium.

[Claim 2] The record regenerative apparatus characterized by having further a display means to display the information reproduced by said playback means with the hour entry about time amount.

[Claim 3] Said hour entry is a record regenerative apparatus according to claim 2 characterized by being record time of day when the residual time between the

time of playback of the elapsed time between the time of record of said information being started and the time of playback of said information being made and said information being made and the time of record of said information being made or said information currently reproduced is recorded.

[Claim 4] The record regenerative apparatus according to claim 3 characterized by having further a selection means to choose any of said elapsed time, residual time, or the record time of day are displayed as said hour entry.

[Claim 5] It is the record regenerative apparatus according to claim 3 which is further equipped with a modification means to change the playback location by said playback means, and is characterized by said display means changing said hour entry corresponding to said playback location changed by said modification means.

[Claim 6] A setting means to set up the chart lasting time which records said information, and the bit rate information about the bit rate of the information, A calculation means to compute the need [of being storage capacity required recording said information] capacity based on said chart lasting time and bit rate information which were set up by said setting means, It is the record regenerative apparatus according to claim 1 which equips said information

record medium with a secured means to secure the need [of being a record section more than said need capacity] field, further, and is characterized by said record means recording said information on said need field.

[Claim 7] Said playback means is a record regenerative apparatus according to claim 6 characterized by reproducing said information already recorded on the record section from the head of said need field to the location where said record means is recording.

[Claim 8] The record regenerative apparatus according to claim 1 characterized by having further a coding means to encode said information which said record means records on said information record medium, and a decryption means to decrypt said information encoded by said coding means.

[Claim 9] Said coding means is a record regenerative apparatus according to claim 8 characterized by interrupting processing corresponding to the amount of data of the coding result which has a storage means to store the coding result of said information temporarily, and is memorized by said storage means.

[Claim 10] The record playback approach which is the record playback approach of performing informational record and playback, and is characterized by reproducing said information already recorded on the information record medium

by recording said information on an information record medium, and coincidence from the location of arbitration.

[Claim 11] The record medium which is a record medium with which the program for making informational record and playback perform is recorded on the computer, and is characterized by to record the program for making the processing which reproduces said information already recorded by the information record medium from the location of arbitration perform on recording said information on an information record medium, and coincidence.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention is used when performing record and playback of an image etc. in a record regenerative apparatus and the record playback approach, and a list about a record medium, and it relates to a record medium at a suitable record regenerative apparatus and the suitable record playback approach, and a list.

[0002]

[Description of the Prior Art] The highly efficient computer which an individual can also purchase is realized at a low price with improvement in the speed of CPU (Central Processing Unit) in recent years, advanced features, large-capacity-izing of the record medium (storage) of memory, and a hard disk and others, low-pricing of the hardware which includes these further, etc.

[0003]

[Problem(s) to be Solved by the Invention] The request of the difficult amount of data being huge, for example, a user performing record for an image, playback, and various processings of edit and others by easy actuation conventionally, has been increasing with the spread of the above cheap and highly efficient computers.

[0004] This invention is made in view of such a situation, and enables it to perform various kinds of processings which respond to a user's request by easy actuation.

[0005]

[Means for Solving the Problem] A record regenerative apparatus according to claim 1 is characterized by a playback means reproducing the information already recorded on the information record medium from the location of arbitration, while the record means is recording information on the information record medium.

[0006] The record playback approach according to claim 10 is characterized by reproducing the information already recorded on the information record medium by recording information on an information record medium, and coincidence

from the location of arbitration.

[0007] A record medium according to claim 11 is characterized by recording the program for making the processing which reproduces the information already recorded by the information record medium from the location of arbitration perform to a computer on recording information on an information record medium, and coincidence.

[0008] In the record regenerative apparatus according to claim 1, the playback means is made as [reproduce / the information already recorded on the information record medium / from the location of arbitration], while the record means is recording information on the information record medium.

[0009] In the record playback approach according to claim 10, it is made as [reproduce / the information already recorded on recording information on an information record medium, and coincidence by the information record medium / from the location of arbitration].

[0010] The program for making the processing which reproduces the information already recorded on the information record medium from the location of arbitration perform to a computer is recorded on recording information on an information record medium, and coincidence by the record medium according to

claim 11.

[0011]

[Embodiment of the Invention] Although the gestalt of operation of this invention is explained below, it is as follows, when the gestalt (however, an example) of operation [/ in the parenthesis after each means] is added and the description of this invention is described before that, in order to clarify correspondence relation between each means of invention given in a claim, and the gestalt of the following operations.

[0012] Namely, a record regenerative apparatus according to claim 1 is a record regenerative apparatus which performs informational record and playback. A record means to record information on an information record medium (for example, the processing step S5 of the program shown in drawing 11 , the processing step S15 of the program shown in drawing 12 , etc.), Have playback means (for example, processing step S40 of the program shown in drawing 17 etc.) to reproduce the information recorded on the information record medium, and while the record means is recording information on the information record medium, a playback means It is characterized by reproducing the information already recorded on the information record medium from the location of

arbitration.

[0013] A record regenerative apparatus according to claim 2 is characterized by having further display means (for example, playback window 341 shown in drawing 15) to display the information reproduced by the playback means with the hour entry about time amount.

[0014] A record regenerative apparatus according to claim 4 is characterized by having further selection means (for example, playback time amount display modification carbon button 353 shown in drawing 15 (TIME)) to choose any of elapsed time, residual time, or the record time of day are displayed as a hour entry.

[0015] A record regenerative apparatus according to claim 5 is further equipped with modification means (for example, slider 354 shown in drawing 15) to change the playback location by the playback means, and a display means is characterized by changing a hour entry corresponding to the playback location changed by the modification means.

[0016] A setting means to set up the chart lasting time on which a record regenerative apparatus according to claim 6 records information, and the bit rate information about the bit rate of the information (for example, tape setting dialog

box 321 shown in drawing 8), It is based on the chart lasting time and bit rate information which were set up by the setting means. A calculation means to compute the need [of being storage capacity required recording information] capacity (for example, the processing step S1 of the program shown in drawing 11 , the processing step S11 of the program shown in drawing 12 , etc.), A secured means to secure the need [of being a record section more than need capacity] field to an information record medium (For example, the processing step S2 of the program shown in drawing 11 , the processing step S12 of the program shown in drawing 12 , etc.) It has further and a record means is characterized by recording information on a need field.

[0017] A record regenerative apparatus according to claim 8 is characterized by having further coding means (for example, MPEG1 real-time encoder board 213 shown in drawing 5) to encode the information which a record means records on an information record medium, and decryption means (for example, MPEG1 software decoder 201A shown in drawing 18) to decrypt the information encoded by the coding means.

[0018] A record regenerative apparatus according to claim 9 has storage means (for example, output buffer 118 shown in drawing 6) by which a coding means

stores an informational coding result temporarily, and it is characterized by interrupting processing corresponding to the amount of data of the coding result memorized by the storage means.

[0019] In addition, of course, this publication does not mean limiting to what described each means above.

[0020] Drawing 1 and drawing 2 show the example of a configuration of the gestalt of 1 operation of the personal computer which applied this invention.

[0021] This personal computer is constituted by the display 51 which displays an image on the keyboard 21 operated when inputting a command to a body 31 and a body 31, a mouse 22, and a list.

[0022] A body 31 is the so-called mini tower type of thing, for example, 367.9mm, further, the width of face is set to 225mm for depth, and height is set to 451.5mm. Moreover, between the front face of a body 31, and the side face, the field 32 and field 33 which combine both aslant are formed. And the power button 34 operated when the power source of a body 31 is turned on or turned off is arranged in the upper part of one field 32 of them.

[0023] Moreover, when the peripheral device connected to a body 31 is laid in the top face of a body 31, the crevice 35 is formed in the location corresponding

to the leg of a peripheral device so that the leg of the peripheral device may be stabilized on the top face of a body 31 and may be arranged on it.

[0024] The under panel 36 and the top of the panel 37 are established in the front face of a body 31. The under panel 36 can be changed into the condition of having cratered in the body 31 side, with the spring which is not illustrated from the condition which is always energized so that it may project outside, pressed the under panel 36 by a user resisting the energization force of the spring, and was projected. Moreover, the top of the panel 37 is shown at the guide 45 on either side, and migration of it in the vertical direction is enabled. The panel 37 is having migration to down [that] besides regulated, when it is in the condition which the under panel 36 projected.

[0025] When using a body 31, a user resists the energization force of a spring and changes the under panel 36 into the condition of having pressed and cratered in the body 31 side. Thereby, regulation of migration to down [of the top of the panel 37] is canceled, and it moves downward along with a guide 45 on the top of the panel 37. Consequently, as shown in drawing 2 , FDD (floppy disk drive)41 built in the body 31, CD-ROM (Compact Disc-Read Only Memory) / CD-R (Recordable) drive 42 (suitably henceforth CD drive), and the AV (Audio

Visual) terminal area 43 will be in the condition of having exposed.

[0026] In addition, in addition to this, the extension 44 is formed and it is made by the body 31 as [attach / other predetermined devices].

[0027] When stopping use, a user applies a finger to the crevice 38 currently formed in the upper part of the top of the panel 37, and moves the top of the panel 37 up. When the top of the panel 37 moves up to a position along with a guide 45, the under panel 36 will be in the condition of having projected outside according to the energization force of a spring, and will regulate migration to down [of the top of the panel 37].

[0028] Thus, in order to show width of face narrowly, he is trying for a body 31 to form the taper-like sides 32 and 33 in the corner of a front face and a side face. Moreover, while preparing the panel (top of the panel 37) which can be freely slid to a transverse plane and protecting an internal device, an internal device is not exposed and it is made to realize a simple design image in a flat by considering as the condition of having blockaded the top of the panel 37 at the time of intact.

[0029] Moreover, in consideration of the possibilities to a future AV equipment, this top of the panel 37 is considered as the design which can be changed by the drawer type, a rotating type type, etc.

[0030] The display 51 is constituted by the display 53 fundamentally combined with the horizontal direction (the pan direction) and the perpendicular direction (the direction of a tilt) free [migration] to a plinth 52 and this plinth 52. The crevice 54 is established in the transverse plane of a plinth 52.

[0031] CRT (Cathode Ray Tube)55 which constitutes a high definition 17 mold Trinitron monitor is arranged, and two loudspeakers 59 and 60 are all arranged to the inside by the fields 56 and 57 across the right and left, and it is made at the front of a display 53 as [realize / by this / a high-definition image and powerful nature playback of stereo loud sound].

[0032] before [top-face] a display 53, the microphone (microphone) 24 for incorporating the voice which the user uttered attaches -- having -- **** -- this microphone 24 and the above-mentioned loudspeakers 59 and 60 -- for example, it has come to be able to perform realizing the so-called handsfree phon etc.

[0033] The slot 58 is formed in the center of the top face of a display 53. When the code of a microphone 24 is held and also the television camera for constituting a TV phone is laid on a display 51, for example, that code can be held in this slot 58.

[0034] Drawing 3 shows the example of a detail configuration of the transverse

plane of a body 31.

[0035] The line indicator 61 is formed in the upper part of the above-mentioned power button 34, and the power source of a body 31 turns on or switches off this line indicator 61, respectively, ON or when it is off. Moreover, the hard disk access indicator light 63 is formed in the lower part of a power button 34. The body 31 contains the hard disk 212 (drawing 5), and when access is made by this hard disk 212, it turns on the hard disk lamp 63 in orange, so that it may mention later.

[0036] FDD41 is [3.5 inches] for FD (1.44MB (megabyte) / 1.2MB / 720KB (kilobyte)), and the floppy disk drive access indicator light 64 and the floppy disk eject button 66 are formed in the transverse plane. The floppy disk drive access indicator light 64 is turned on when access is made by FD, and the floppy disk eject button 66 is pressed when taking out FD from FDD41.

[0037] In the CD drive 42, R/W of the data to read-out of the data from a CD-ROM disk (not shown) and the CD-R (CD-R FS) disk 211 (drawing 5) is performed. In addition, in the CD drive 42, read-out is 8X, and writing is 2X and is made as [carry /, respectively], for example.

[0038] The eject button 68, the ejection hole 69, and the access indicator light 70

are formed in the transverse plane of the CD drive 42. An eject button 68 is operated when pulling out the tray of the CD drive 42, and the ejection hole 69 is operated by that in which the point sharpened, when a tray cannot be pulled out depending on an eject button 68 and the tray is pulled out manually. An access indicator light 70 is turned on when access is made by the CD-ROM disk and the CD-R disk 211.

[0039] Two voice input terminals (pin jack) of S image input terminal, the image input terminal for composite signals, L (Left), and R (Right) channel are prepared in the AV terminal area 43. When there is in edit etc. the image and voice which were recorded with the video camera, VTR (Video Tape Recoder), etc., the image and voice are inputted from these terminals.

[0040] Drawing 4 shows the example of a detail configuration of the tooth back of a body 31.

[0041] The power-source input terminal 71 is formed in the upper right of the tooth back of a body 31, and a power source is supplied to a body 31 by connecting a power cord (not shown) here.

[0042] Moreover, the keyboard terminal 72 and the mouse terminal 73 are formed in the upper left on the back, and a keyboard 21 or a mouse 22 is

connected to this keyboard terminal 72 or the mouse terminal 73, respectively. The USB (Universal Serial Bus) terminal 74 is formed in the lower part of the mouse terminal 73, and the device corresponding to USB specification is connected to it here. Furthermore, the printer terminal 75 and two serial terminals 76 are formed in the lower part. A printer, an image scanner, etc. are connected to the printer terminal 75. Moreover, for example, an infrared communication adapter etc. is connected to the serial terminal 76. That is, with the gestalt of this operation, it is made as [perform / infrared ray communication] between a body 31 and other devices by connecting to the serial terminal 76 the infrared communication adapter which is an interface for infrared ray communication.

[0043] The game terminal 77 is formed in the lower part of the printer terminal 75, and a joy stick and a MIDI (Musical Instrument DigtalInterface) device are connected to the game terminal 77.

[0044] The headphone terminal 78, the Rhine input terminal 79, and the microphone terminal 80 are formed in the lower part of the serial terminal 76 one by one. Audio equipment is connected to the Rhine input terminal 79, and a microphone 24 (drawing 1 , drawing 2) is connected to the microphone terminal

80 for an external speaker at the headphone terminal 78, respectively.

[0045] In addition, the picture showing what is connected to each terminal is displayed on the right-hand side of the above terminal.

[0046] The image output terminal 81, S image output terminal 82, and the monitor terminal 83 for composite signals are prepared in the lower part of the microphone terminal 80. From the image output terminal 81 or S image output terminal 82, the video signal or S image of a composite is outputted. The monitor terminal 83 is connected with a display 51.

[0047] The AV terminal area 84 is formed in the lower part of the image output terminal 81, S image output terminal 82, and the monitor terminal 83. S image input terminal, the image input terminal for composite signals, L, and the voice input terminal of R channels are prepared in the AV terminal area 84 like the front AV terminal area 43.

[0048] The antenna terminal 85 is formed in the right-hand side of the AV terminal area 84, and, thereby, it is made as [receive / the television signal of for example, a VHF (Very High Frequency) band and a UHF (Ultra High Frequency) band].

[0049] Furthermore, the Rhine jack 86 and the telephone jack 87 are formed in

the lower part on the back. The Rhine jack 86 is connected with the telephone line, and the telephone jack 87 is connected with telephone, facsimile, etc.

[0050] Next, drawing 5 shows drawing 1 and the example of an electric configuration of the computer of drawing 2 .

[0051] While a computer contains the MPEG(Moving Picture Experts Group) 1 real-time encoder board 213 which contained TV (Television) tuner 213A with the gestalt of this operation As an application program, the thing for performing the image processing of edit of an image, record, playback, MPEG decoding, and others is equipped standardly. By this It is made as [perform / work of the video CD which recorded edit of the image and voice which were photoed with the video camera 214 and the image after the edit, and voice etc. / easily]. Moreover, the television broadcasting program received by TV tuner 213A is recorded on videotape, and it is further made as [perform / playback of the scene of the arbitration of an image / finishing / an image transcription / already / (image) etc. / easily], performing the image transcription.

[0052] That is, a microprocessor 201 is having been recorded on the hard disk 212, for example, performing various kinds of application programs similarly recorded on the hard disk 212 under control of operating systems, such as

Windows 95 (Windows 95) (trademark) by Microsoft Corp., for example, performs record of an image, playback, edit, decoding, and other predetermined processings. In addition, as a microprocessor 201, the PentiumII processor (266MHz, secondary built-in cache memory (not shown) 512KB) which added the optimization to MMX technology and 16 bit codes is adopted as Pentium Pro made from Intel, for example, and even when this processes a lot of data, such as an image and voice, it is made as [demonstrate / high performance] (Pentium and MMX are a trademark).

[0053] Main memory 202 memorizes required data on the program which a microprocessor 201 performs, and actuation of a microprocessor 201. Here, main memory 202 is a criterion, is carried 32MB and made as [perform / processing of an image with much amount of data etc. / by this / at high speed]. In addition, main memory 202 is max, for example, is made as [extend / it / to 128MB].

[0054] A bus bridge 204 controls an exchange of the data between an internal bus and expansion buses, such as for example, a PCI (Peripheral Component Interconnect) local bus and an ISA (Industry Standard Architecture) bus.

[0055] The above microprocessor 201, main memory 202, and a bus bridge 204

are mutually connected through the internal bus, and the remaining block is mutually connected through the expansion bus. In addition, the bus bridge 204 is connected with both the internal bus and the expansion bus.

[0056] Modems 206 are DSVD/DATA/FAX modem of for example, 33.6Kbps (bit per second), and control the communication link through the telephone line. In a modem 206, an image, voice, etc. can be received from the Internet etc. and it can consider as the object of processings of this, such as encoding and edit, for example. Furthermore with a modem 206, an image, voice, etc. which carried out edit, coding, etc. can also be transmitted outside. Moreover, in a modem 206, while transmitting the voice inputted into the microphone 24, a handsfree phon is realized with receiving the transmitted voice and outputting from loudspeakers 59 and 60. In addition, a transfer rate is set for example, to 14.4Kbps(es) when using a modem 206 as a FAX modem.

[0057] The I/O (Input/Output) interface 207 functions as an interface which receives the sound signal as an electrical signal which outputs the actuation signal corresponding to actuation of a keyboard 21 and a mouse 22, and is outputted from a microphone 24.

[0058] The secondary memory interface 210 functions as an interface for writing

the data to the CD-R (Compact Disc Recodable) disk 211, a CD-ROM disk (not shown) and a hard disk (HD (Hard Disk)) 212, FD (not shown), etc.

[0059] An image, voice, etc. which were encoded on the encoder board 213 are recorded on the CD-R disk 211, and, thereby, it is made as [make / the video CD of user original]. In addition, the CD drive 42 also supports CD-RFS. Moreover, it is max, for example, is made here to the CD-R disk 211 as [perform / about 650MB (the time of CD-R FS about 520MB) of writing].

[0060] A hard disk 212 is 4.3GB (G cutting tool) of thing of high-speed busmaster IDE (Integrated DriveElectronics) transfer correspondence for example, and required data etc. are recorded there on the encoder board 213 on the data by which compression coding was carried out, and processing of a microprocessor 201. In addition, it is made by the body 31 as [attach / a SCSI (Small Computer System Interface) board], and is made as [extend / by this / the hard disk (drive) which has a SCSI interface].

[0061] Moreover, the operating system, the application program for making a microprocessor 201 perform record of an image, playback, edit, decoding, and other processings further, etc. are recorded on the hard disk 212.

[0062] That is, what is called "Slipclip" (slip clip) is built in here as an application

program for the so-called video work of record of an image, playback, edit, and others.

[0063] Here, "Slipclip" consists of a "slip recorder", a "clip editor", a "clip viewer", a "video CD creator", and five application programs called a "video CD copy tool."

[0064] A "slip recorder" is used, when recording an image and voice and reproducing the image and voice which were recorded. A "clip editor" is used when editing the recorded image (and voice which accompanies it). A "clip viewer" is used when managing the image and voice which were recorded. A "video CD creator" is used, when recording the edited image on the CD-R disk 211 and making a video CD. A "video CD copy tool" is used when making the copy of the same video CD as the video CD made before.

[0065] In addition, with the gestalt of this operation, in order to prevent work of the so-called pirate board of a video CD, work and the copy of a video CD are made as [carry / it / only for the image which performed edit etc. in the body 31].

[0066] Here, especially in the following, the "slip recorder", the "clip editor", and the "clip viewer" related to record of an image, playback, and edit are explained among a "slip recorder", a "clip editor", a "clip viewer", a "video CD creator", and

a "video CD copy tool."

[0067] What performs decoding based on the specification of MPEG1 as an application program for making a microprocessor 201 perform further decoding of the data encoded on the encoder board 213 is recorded on the hard disk 212. That is, encoding of an image is hardware and the decoding is realized by software here. In addition, it is also possible to realize encoding of an image by software, and decoding can also be realized by hardware.

[0068] The encoder board (MPEG1 real-time encoder board) 213 is real time, for example, encodes an image and voice based on the specification of MPEG1, and is made as [perform / encoding with four kinds of image transcription modes, such as encoding with the high bit rate for a high-definition image transcription and encoding with the low bit rate for transmission,]. Here, there are some which are called "High", "Normal", "Long", and "Network" to order with a high bit rate in four kinds of image transcription modes so that it may mention later. In addition, image transcription mode "Normal" is a thing based on the specification of a video CD, and when it encodes in this mode, it can perform per GB and record for about 100 minutes.

[0069] As mentioned above, the encoder board 213 contains TV tuner 213A

which receives a television broadcasting program, and carries out MPEG encoding of the program which this TV tuner 213A received. Moreover, the encoder board 213 is made as [encode / the data supplied through an expansion bus, the data (for example, image which VTR216 reproduced) supplied through AV processing circuit 215, the data which are external equipment further and which are supplied from a video camera 214, etc.].

[0070] In addition, a setup of 62 channels of 1 thru/or 62 is possible for TV tuner 213A, and a stereo and reception of two languages are possible for it about an audio, for example.

[0071] In a video camera 214, photography of an image etc. is performed and the encoder board 213 is supplied, for example. In addition, the encoder board 213 has the interface with a video camera 214, and is made as [input / by this / into the encoder board 213 / the image or voice which were photoed with the video camera 214].

[0072] AV processing circuit 215 consists of VGA (Video Graphics Array), a three-dimension accelerator (neither is illustrated), etc., and is made as [perform / processing required for a display of the graphics and others in a display 51]. Furthermore, AV processing circuit 215 is made as [perform / processing

required for the voice output to loudspeakers 59 and 60]. Moreover, in NTSC encoder 215A, when NTSC encoder 215A is built in, for example, it outputs an image to VTR216, AV processing circuit 215 is outputted, after changing an image into the thing based on NTSC system.

[0073] Furthermore, AV processing circuit 215 is connected with the encoder board 213 for example, through the AMC bus etc. The encoder board 213 is made as [memorize / the image which carries out MPEG encoding / to the frame memory 110 (drawing 6) mentioned later / once]. When carrying out the monitor of the image which carries out MPEG encoding is directed The image memorized by this frame memory 110 is supplied to AV processing circuit 215 through an AMC bus from the encoder board 213, and, thereby, it is made as [display / that image] in the display 51.

[0074] In addition, AV processing circuit 215 draws to VRAM (Video RAM (Random Access Memory))203, and is made as [display / an image] with outputting the contents of drawing to a display 51.

[0075] VTR216 records the image and voice which AV processing circuit 215 outputs if needed.

[0076] Next, drawing 6 shows the example of a configuration of the encoder

board 213 of drawing 5 . In addition, in drawing 6 , only the block related to MPEG encoding is illustrated and illustration of other blocks, i.e., the block which constitutes the TV tuner 213, is omitted. Furthermore, in drawing 6 , only the block related to MPEG encoding of an image is shown, and the illustration of a block related to audio MPEG encoding is omitted to it.

[0077] The digital image data of one frame constituted from a predetermined number of pixels by the input terminal 101 are supplied at a rate, such as about 30 etc. frames, in 1 second.

[0078] The image data supplied to the input terminal 101 stores the image data temporarily, and is transmitted to the block divider 111 and the motion detector 120 through the frame memory 110 which can memorize images of two or more sheets for changing in predetermined sequence, such as for example, 27 frames. The block divider 111 divides into the block of a 8x8-pixel brightness component and the chroma components Cb and Cr the frame of the image data supplied from a frame memory 110. Here, a macro block (MB) consists of a total of six blocks with the block of four brightness components, and the block per chroma components Cb and Cr corresponding to it.

[0079] the image data from the block divider 111 -- a macro block unit -- it is --

difference -- a vessel 112 is supplied. difference -- difference with the inter-frame prediction image data which mentions a vessel 112 later with the image data from the block divider 111 -- taking -- the difference -- a value is supplied to the switched terminal b of a change-over switch 113 as data of a frame with which inter-frame predicting coding mentioned later is performed. Moreover, the switched terminal a of a change-over switch 113 is supplied as data of a frame with which coding in a frame which the image data which the block divider 111 outputs mentions later is performed.

[0080] The image data supplied to the terminal of the direction which the change-over switch 113 chose either of the terminals a or b, and was chosen by this is supplied to the DCT (discrete cosine transform) circuit 14 per block. The DCT circuit 114 carries out DCT processing of the image data inputted there, and outputs the DCT multiplier obtained as a result to a quantizer 115. A quantizer 115 quantizes the DCT multiplier from the DCT circuit 114 by the predetermined quantization step, and outputs the quantization multiplier obtained as a result to the zigzag scan circuit 116.

[0081] The zigzag scan circuit 116 carries out a zigzag scan, is the sequence and outputs the quantization multiplier of a block unit to the VLC (variable length

coding) circuit 117, for example. The VLC circuit 117 carries out VLC processing of the quantization multiplier from the zigzag scan circuit 116, and supplies the variable-length coded data obtained as a result to an output buffer 118. By having the memory capacity of 160KB and storing temporarily the variable-length coded data from the VLC circuit 117, smoothing etc. carries out the amount of data of the output, and an output buffer 118 outputs it from an output terminal 102. The data outputted from the output terminal 102 are supplied and recorded on a hard disk 212.

[0082] Moreover, an output buffer 118 outputs the amount of data accumulation to the quantization step controller 119. the quantization step controller 119 -- the amount of data accumulation from an output buffer 118 -- being based -- an output buffer 118 -- overflow -- and a quantization step is set up so that an underflow may not be carried out, and it outputs to a quantizer 115. In the quantizer 115 mentioned above, quantization is performed according to the quantization step which does in this way and is supplied from the quantization step controller 119.

[0083] On the other hand, the quantization multiplier which a quantizer 115 outputs is supplied not only to the zigzag scan circuit 116 but to the reverse

quantizer 126. The reverse quantizer 126 is made into a DCT multiplier by reverse-quantizing the quantization multiplier from a quantizer 115, and is outputted to the reverse DCT circuit 125. The reverse DCT circuit 125 carries out reverse DCT processing of the DCT multiplier, and supplies the data obtained as a result to an adder 124. Furthermore, it is made as [supply / the inter-frame prediction image data which the motion compensation machine 121 outputs to an adder 124 through the change-over switch 123 which serves as ON when processing the frame of inter-frame predicting coding]. An adder 124 adds these data and a frame memory 122 is made to supply and memorize it.

[0084] and the inter-frame prediction image data which the motion compensation machine 121 carries out the motion compensation of the data memorized by the frame memory 122 according to the motion vector supplied from the motion detector 120, and is obtained as a result -- difference -- a vessel 112 and a change-over switch 123 are supplied.

[0085] Here, each frame which constitutes the image for coding (dynamic image) is arranged in order of a display, and it is described as I0, B1, B-2, P3, B4, B5, P6, B7, B8, I9, B10, B11 and B12, and ... from the head. The figure which I, above-mentioned P, and above-mentioned B show that the frame is I picture, P

picture, and B picture, and follows I, P, and B expresses the display order.

[0086] In MPEG, an image I0 is encoded first. Next, although an image P3 is encoded, image P3 themselves are not encoded but difference with images P3 and I0 is encoded. Furthermore, although an image B1 is encoded by the degree, image B1 itself is not encoded but the difference of an image B1 and the average of an image I0, either of P3, or its both is encoded. In this case, what makes the smallest the so-called prediction remainder of the average values of images I0 and P3 or both of those (that whose amount of data encoded and obtained decreases most) is chosen, and it, an image B1, and difference are encoded.

[0087] Although image B-2 is encoded after coding of an image B1, image B-2 itself is not encoded but the difference of image B-2 and the average of an image I0, either of P3, or its both is encoded too. Moreover, what makes the smallest images I0 and P3 or the prediction remainder of the averages of those both also in this case is chosen, and it, image B-2, and difference are encoded.

[0088] Then, although an image P6 is encoded, image P6 themselves are not encoded but difference with images P6 and P3 is encoded. Hereafter, coding is performed by the same procedure.

[0089] Here, the correspondence relation between the image for coding and the image which serves as a partner who takes difference in that case is shown below in order of coding.

The order of coding The image for coding The image which serves as a partner who takes difference (1) I0 - (2) P3 I0 or P3 (3) B1 I0 or P3 (4) B-2 I0 or P3 (5) P6 P3 (6) B4 P3 or P6 (7) B5 P3 or P6 (8) P9 P6 (9) B7 P6 or P9 (10) B8P6 or P9 (11) I9 - (12) P12 I9 (13) B10 I9 or P12 (14) B11 I9 or P12 - - - [0090] As mentioned above, coding sequence becomes I0, P3, B1, B-2, P6, B4, B5, P9, B7, B8, I9, P12, B10 and B11, and ..., and turns into different sequence from a display order. The data after coding are outputted in such sequence.

[0091] In addition, about P picture and B picture, as mentioned above, usually difference with other images is encoded, but when the amount of data decreases rather than the direction which encoded the image itself encodes difference, the image itself is encoded.

[0092] With the encoder board 213 of drawing 6 , encoding is performed as mentioned above.

[0093] Therefore, at the time of coding of an image I0 of the 1st sheet, it is read from a frame memory 110, and the image data is supplied to the block divider

111, and is blocked. Image data is made four brightness blocks mentioned above and the block of Cb and Cr by blocking by the block divider 111, and a sequential output is carried out. The image data which the change-over switch 113 has chosen the switched terminal a at the time of coding of I picture, therefore the block divider 111 outputs is supplied to the DCT circuit 114 through a change-over switch 113. In the DCT circuit 114, to the image data of the block unit supplied there, two-dimensional DCT processing in every direction is performed, and, thereby, the image data on a time-axis is changed into the DCT multiplier as data on a frequency shaft.

[0094] A quantizer 115 is supplied, and it quantizes there according to the quantization step from the quantization step controller 119, and let this DCT multiplier be a quantization multiplier. A zigzag scan is carried out in the zigzag scan circuit 116, and this quantization multiplier is outputted in that sequence.

[0095] The quantization multiplier outputted from the zigzag scan circuit 116 is supplied to the VLC circuit 117, and the so-called variable-length-coding processing of Huffman coding etc. is performed there. Once the variable-length coded data obtained as a result is stored in an output buffer 118, it is outputted with a fixed bit rate. Therefore, an output buffer 118 plays the role of the memory

for the so to speak buffer for outputting the data generated irregularly with a fixed bit rate.

[0096] As mentioned above, although the image I0 which is I picture (Intra Picture) is encoded by independent [its], such coding is called coding in a frame (intra (Intra)). In addition, decoding of the image encoded in the frame is performed by the above-mentioned reverse procedure.

[0097] Next, coding of an image P3 of the 2nd sheet is explained. Although the image after the 2nd sheet can also be encoded as an I picture, then, compressibility becomes low. Then, the image after the 2nd sheet is encoded as follows using a continuous image having correlation.

[0098] That is, the motion detector 120 detects the part which was well alike in a macro block out of the image I0 of the 1st sheet for every macro block which constitutes the image P3 of the 2nd sheet, and detects the vector showing a gap of the part and relative physical relationship with a corresponding macro block as a motion vector. Here, about the detection approach of a motion vector, it is ISO/ISC, for example. 11172-2 annex Since it is indicated by D.6.2 etc., the explanation is omitted here.

[0099] and difference with the block acquired from the image I0 of the 1st sheet

by there being nothing since the block is supplied to the DCT circuit 114 as it is, and performing a motion compensation about the image P3 of the 2nd sheet according to the motion vector for every block -- difference -- it calculates with a vessel 112 and the DCT circuit 114 is supplied.

[0100] if correlation between the block acquired by carrying out the motion compensation of the image I0 of the 1st sheet according to a motion vector and the block of an image P3 of the 2nd sheet is high here -- those difference -- small -- becoming -- the block of an image P3 of the 2nd sheet -- intra -- the direction of the amount of data obtained as a result of coding which encoded difference decreases rather than encoding.

[0101] Thus, the technique of encoding difference is called inter-frame (interchange (Inter)) coding.

[0102] in addition, interchange coding which encodes difference depending on the height of correlation with the complexity of the image which the amount of data of direction which encodes difference does not necessarily decrease, and it always encodes, and the frame of order -- intra -- compressibility may become [the direction which encoded] high in such a case, intra -- coding is performed. intra -- it can be set up per macro block whether it encodes or interchange

coding is performed.

[0103] By the way, in order to perform interchange coding, it is necessary to ask for the decode image which decodes the data encoded previously and is obtained.

[0104] So, the so-called local decoder is formed in the encoder board 213. That is, the motion compensation machine 121, a frame memory 122, the change-over switch 123, the adder 124, the reverse DCT circuit 125, and the reverse quantizer 126 constitute the local decoder. In addition, the image data memorized by the frame memory 122 is called a local DEKODETTO picture (Local Decoded Picture) or local DEKODETTO data (Local Decoded Data). On the other hand, the image data before encoding is called an original picture (Original Picture) or original data (Original Data).

[0105] When the output of a quantizer 115 minds the reverse quantizer 126 and the reverse DCT circuit 125 at the time of coding of an image I0 of the 1st sheet, local decoding is carried out (in this case, a change-over switch 123 is turned OFF, consequently processing is not substantially performed with an adder 124), and a frame memory 122 memorizes.

[0106] In addition, the image memorized by the frame memory 122 is the same

as the image which encoded not an original picture but it and carried out local decoding further and which is obtained by the decoder side. Therefore, the image of a frame memory 122 becomes that in which image quality deteriorated somewhat from an original picture by coding and decryption processing.

[0107] the condition that that to which the image P3 of the 2nd sheet carried out local decoding of the image I0 of the 1st sheet is memorized by the frame memory 122 -- setting -- a frame memory 110 to the block divider 111 -- minding -- a block unit -- difference -- a vessel 112 is supplied. In addition, in the motion detector 120, detection of the motion vector of an image P3 needs to be completed by this point in time.

[0108] On the other hand, the motion detector 120 supplies the motion vector detected per macro block to the motion compensation machine 121 about the image P3 of the 2nd sheet. the motion compensation data (MC data) (1 macro block) which the motion compensation machine 121 carries out the motion compensation (MC (MotionCompensation)) of the image I0 which local decoding is already carried out and is memorized by the frame memory 122 according to the motion vector from the motion detector 120, and are obtained as a result -- as inter-frame prediction image data -- difference -- a vessel 112 is supplied.

[0109] difference -- with a vessel 112, the difference of corresponding pixels of the original data of the image P3 supplied through the block divider 111 and the inter-frame prediction image data supplied from the motion compensation machine 121 calculates. and the difference obtained as a result -- through a change-over switch 113, a value is supplied to the DCT circuit 114 and is hereafter encoded like the case in I picture. Therefore, a change-over switch 113 chooses the switched terminal b in this case.

[0110] As mentioned above, about the image P3 which is P picture (Predicted Picture), difference with the prediction image obtained by carrying out the motion compensation of the reference image fundamentally by using as a reference image I picture or P picture encoded just before that is encoded.

[0111] That is, about P picture, about the macro block (INTAMAKURO block) whose amount of data decreases [the direction which carries out interchange coding], the switched terminal b is chosen in a change-over switch 113, and interchange coding is performed. moreover, intra -- about the macro block (intra macro block) whose amount of data decreases [the direction to encode], the switched terminal a chooses in a change-over switch 113 -- having -- intra -- coding is performed.

[0112] in addition, the intra among the macro blocks of P picture -- local decoding of what was encoded is carried out like I picture, and it is memorized by the frame memory 122. Moreover, by adding the thing through the reverse quantizer 126 and the reverse DCT circuit 125, and the inter-frame prediction image data supplied through the change-over switch 123 made into the ON state with an adder 124, local decoding of that by which interchange coding was carried out is carried out, and it is memorized by the frame memory 122.

[0113] Next, coding of an image B1 of the 3rd sheet is explained.

[0114] In the time of coding of the image B1 which is B picture, two motion vectors to I picture or P picture displayed just before the image B1, and I picture or P picture displayed immediately after that are detected in the motion detector 120. therefore -- here -- the images I0 and P3 of an image B1 -- it is alike, respectively and the receiving motion vector is detected. Here, the motion vector to the image P3 which is P picture displayed as a forward vector (Forward Vector) immediately after that in the motion vector to the image I0 which is I picture displayed just before an image B1 is called back WORD vector (Backward Bector).

[0115] Difference with the inter-frame prediction image data obtained by carrying

out the motion compensation of what carried out local decoding of the (1) image I0 about the image B1 according to a forward vector, (2) Difference with the inter-frame prediction image data obtained by carrying out the motion compensation of what carried out local decoding of the image P3 according to a back WORD vector, (3) The thing of four, difference with the average value of two inter-frame prediction image data obtained by above-mentioned (1) and (2) and (4) image B1itself **, whose amount of data decreases most is chosen and encoded.

[0116] (1) or the data obtained by a required motion vector's moving, supplying the detector 120 lost-motion compensator 121 (when interchange coding being performed), and performing a motion compensation according to the motion vector when the data of either of (3) are encoded -- difference -- a vessel 112 is supplied. and difference -- in a vessel 112, the difference of the original data of an image B1 and the data from the motion compensation machine 121 is called for, and this is supplied to the DCT circuit 114 through a change-over switch 113. Therefore, a change-over switch 113 chooses the switched terminal b in this case. on the other hand, when the data of (4) are encoded, and coding is performed intra, the data, i.e., the original data of an image B1, is supplied to the

DCT circuit 114 through a change-over switch 113. Therefore, a change-over switch 113 chooses the switched terminal a in this case.

[0117] About the image B1 which is B picture, since it already encodes at the time of the coding and the images I0 and P3 by which local decoding was carried out are memorized by the frame memory, the above coding is attained.

[0118] About image B-2 of the 4th sheet, processing which transposed B1 to B-2 among description in the case of encoding the above-mentioned image B1 is performed.

[0119] About the image P6 of the 5th sheet, processing which transposed P3 to P6 among description in the case of encoding the above-mentioned image P3, and transposed I0 to P3, respectively is performed.

[0120] Since it becomes an above-mentioned repeat about the image after the 6th sheet, explanation is omitted.

[0121] In the encoder board 213 the image of each screen by the way, by which picture type of I picture, P picture, or the B pictures (Picture Type) Moreover, although chosen as mentioned above based on the amount of data generated as a result of the coding, by what kind of macro block type (Macro Block Type) the macro block of each picture is encoded An exact value is not known if the

amount of data is not actually encoded depending on the image to encode.

[0122] However, it is necessary to make regularity fundamentally the bit rate of the bit stream obtained by performing MPEG encoding, and it has the approach of controlling the quantization step (quantization scale) in a quantizer 115 as an approach for it. That is, if a quantization step is enlarged, coarse quantization is performed and the amount of data (the amount of generating signs) can be lessened. Moreover, if a quantization step is made small, fine quantization is performed and the amount of generating signs can be made to increase.

[0123] Specifically, for example, as follows, control of a quantization step is performed.

[0124] That is, in the encoder board 213, the output buffer 118 is formed in the output stage, by storing temporarily the data encoded here, change of a certain amount of amount of generating signs can be absorbed, and the bit rate of the output bit stream can be made regularity.

[0125] However, if generating of coded data (variable-length coded data) at a rate which exceeds a predetermined bit rate continues, the amount of data accumulation of an output buffer 118 will increase, and it will overflow. Moreover, if generating of coded data at a rate which is less than a predetermined bit rate

continues conversely, the amount of data accumulation of an output buffer 118 will decrease and carry out an underflow.

[0126] Then, as mentioned above, the amount of data accumulation of an output buffer 118 (the amount of signs) is fed back to the quantization step controller 119, and in the quantization step controller 119, it is made as [control / a quantization step] based on the amount of data accumulation so that neither overflow nor an underflow may be produced about an output buffer 118.

[0127] That is, the amount of data accumulation of an output buffer 118 becomes close to the capacity, and when it is likely to overflow, the quantization step controller 119 enlarges a quantization step, and, thereby, decreases the amount of generating signs. Moreover, the amount of data accumulation of an output buffer 118 becomes close to 0, and when the underflow of the quantization step controller 119 is likely to be carried out, it makes a quantization step small and, thereby, makes the amount of generating signs increase.

[0128] By the way, the amount of generating signs changes by whether an image is encoded in a frame, or interframe coding is carried out.

[0129] Since the big amount of generating signs generally arises in performing coding in a frame, when there are many amounts of data accumulation of an

output buffer 118, it is necessary to set up a quite big quantization step. However, even if it sets up the greatest quantization step in this case, an output buffer 118 may overflow. Moreover, when it quantizes by the big quantization step, since the image quality of a decode image deteriorates, fundamentally, coding / image quality of an image decrypted will also deteriorate by using the decode image as a reference image. Therefore, in performing coding in a frame, in order to prevent overflow of an output buffer 118 and to prevent degradation of the image quality of a decode image, it is necessary to secure sufficient free area to an output buffer 118.

[0130] So, when the sequence that coding in a frame and interframe coding are performed is beforehand recognized based on the signal from the compression approach selection circuitry 132 and coding in a frame is performed, as the quantization step controller 119 will be in the condition that sufficient free area for an output buffer 118 was secured, it is made also as [control / a quantization step].

[0131] By the way, from a viewpoint of the image quality of a decode image, although it is necessary to quantize by the small quantization step and to quantize [image / flat] by the big quantization step about a complicated image,

such a thing is not taken into consideration by the quantization step set up only based on buffer feedback. When the quantization step is not a suitable value from a viewpoint of the complexity of an image, to the image for coding, many amounts of bits will be assigned unfairly, and the small amount of bits will be assigned. If bit allocation unjust in this way is performed to a certain image, since it also influences the bit allotment to other images, it is not desirable.

[0132] Then, in the quantization step controller 119, it is made as [set / a quantization step] not only corresponding to feedback (buffer feedback) of the amount of data accumulation from a buffer 118 but corresponding to the complexity of the image for coding.

[0133] That is, with the encoder board 213, in the image weighting network 130, the picture which was memorized by the frame memory 110 and which will be encoded from now on is read, the evaluation value showing the complexity is computed and the scene change detector 131, the compression approach selection circuitry 132, and the quantization step controller 119 are supplied.

[0134] The quantization step controller 119 learns the relation of the evaluation value corresponding to the complexity about the image supplied from the quantization step actually used for coding of an image, the amount of data (the

amount of generating signs) obtained by quantizing by the quantization step, and the image weighting network 130, and asks for the base quantity child-ized step which is to the base for setting up the following quantization step based on the study result.

[0135] That is, regression analysis is applied using the quantization step actually used for coding of an image, the amount of data (the amount of generating signs) obtained by quantizing by the quantization step, and the evaluation value corresponding to the complexity about the image, and study is performed by making the regression-analysis result into a graph. And a base quantity child-ized step with optimal using for coding of the image is predicted from the graph by making into an argument the evaluation value about the complexity of the image which encodes next.

[0136] And the quantization step controller 119 changes this base quantity child-ized step according to buffer feedback, and sets up that value as a quantization step.

[0137] Since it is what the base quantity child-ized step could be predicted to be with a sufficient precision by study, and the value considered the complexity of an image as, it is asking for a quantization step from such a base quantity

child-ized step, and it becomes possible to raise the image quality of a decode image as compared with the case where a quantization step is controlled only based on buffer feedback.

[0138] In addition, in the scene change detector 131, it is detected based on the evaluation value from the image weighting network 130 whether there was any scene change, and the detection result is supplied to the compression approach selection circuitry 132. In the compression approach selection circuitry 132, the compression approach of an image is chosen as the evaluation value from the image weighting network 130, and a pan using the output of the scene change detector 131 if needed. That is, in the compression approach selection circuitry 132, the compression approach about the macro block type concerning [whether an image is encoded as which picture type of I picture, P picture, or the B pictures or] whether the number of pictures which makes GOP constitute, and a macro block are encoded in a frame, or interframe coding is carried out etc. is chosen, for example.

[0139] The compression approach selection circuitry 132 will control change-over switches 113 and 123 based on whether the macro block of them is encoded in a frame, or interframe coding is carried out, if the compression

approach is chosen. That is, as mentioned above, when performing coding in a frame, a change-over switch 113 is switched to the switched terminal a, and a transfer switch 123 is made into an OFF state. Moreover, when performing interframe coding, a change-over switch 113 is switched to the switched terminal b, and a transfer switch 123 is made into an ON state.

[0140] Furthermore, the compression approach selection circuitry 132 notifies any of coding in a frame, or the interframe coding are performed to the quantization step controller 119. By this notice, the quantization step controller 119 recognizes the sequence that coding in a frame and interframe coding are performed, as mentioned above.

[0141] Here, in the compression approach selection circuitry 132, when encoding as P picture or a B picture carries out long duration continuation of the image and it is chosen, since interframe coding of P picture and the B picture is carried out, if an image with inter-frame low correlation produces them by scene change etc. fundamentally, the amount of generating signs will increase and the image quality of a decode image will deteriorate.

[0142] Then, if the purport that it is made as [supply / from the scene change detector 131 / to the compression approach selection circuitry 132 / the detection

result of a scene change], and the compression approach selection circuitry 132 had a scene change is received as mentioned above, it is made as [choose /, making the picture after the scene change into I picture compulsorily so to speak].

[0143] In addition, as mentioned above, it asks for a base quantity child-ized step by study, and the detail is indicated by JP,8-102951,A for which this applicant applied previously, for example about the approach of setting up a quantization step from the base quantity child-ized step.

[0144] Next, in the image weighting network 130, two parameters showing the complexity of the following images are made as [compute / by referring to a frame memory 110] as an evaluation value for evaluating the image for coding.

[0145] That is, the evaluation value showing the amount of information of the image itself which can predict the amount of generating signs when encoding an image in a frame (the amount of generating signs when encoding an image as an I picture) as the 1st parameter (guess) is computed. Specifically as the 1st parameter, the statistic of total and others of the DCT multiplier obtained by carrying out DCT processing of the image for every block can be used, for example. Moreover, it is also possible to make into the 1st parameter what

asked for the absolute value sum (suitably henceforth the average absolute value sum) of the value which subtracted the average of the pixel value from each pixel value for every block, for example, and took total of the average absolute value sum of each block. In addition, comparatively, the direction which asks for the absolute value sum in this way can make a load smaller than the case where it asks for total of a DCT multiplier, while making small the circuit scale of the image weighting network 130.

[0146] Here, in the image weighting network 130, the total as the 1st parameter (for example, the average absolute value sum) is called for as follows.

[0147] That is, for example, about a certain block S which constitutes the image for coding, from on the leftmost of the block, if the pixel value of the pixel which is in the j-th location downward by the i-th is expressed rightward as Si and j, the average absolute value sum MAD (Mean Absolute Difference) about each block will be now called for according to a degree type (here, it asks about the blocks of brightness, and all the blocks of the color difference, for example.). However, it is also possible to make it ask only about a brightness block for example.

[0148]

[Equation 1]

$$MAD=\sum_{i=1}^{8}\sum_{j=1}^{8}|S_{i,j}-S_{AVE}|$$

... (1)

However, in a formula (1), SAVE expresses the average of the pixel value of Block S.

[0149] And according to a degree type, the total SMAD of the average absolute value sum is called for as the 1st parameter.

[0150] SMAD=sigma MAD ... (2)

However, in a formula (2), sigma expresses the summation about all blocks that constitute an image.

[0151] In addition, in the image weighting network 130, total in the macro block unit of the average absolute value sum MAD expressed with a formula (1) is also called for. This is used for the decision of whether each macro block performed in the compression approach selection circuitry 132 is encoded in a frame, or to carry out interframe coding (forward prediction coding, backward prediction coding, or both-directions predicting coding) etc.

[0152] The evaluation value showing the amount of information of the difference of the image and the reference image used when carrying out interframe coding

which can predict the amount of generating signs when carrying out interframe coding of the image as the 2nd parameter is computed. concrete -- as the 2nd parameter -- the absolute value sum (the following -- suitably -- difference -- it is called the absolute value sum) of the difference of an image and its prediction image (what is obtained by carrying out the motion compensation of the reference image) -- a block unit -- asking -- the difference of each block -- what took total of the absolute value sum can be used.

[0153] here -- difference -- the absolute value sum is called for when detecting a motion vector in the motion detector 120. then, the motion detection result according to the motion detector 120 in the image weighting network 130 -- using -- as the 2nd parameter (for example, difference) -- total of the absolute value sum is called for.

[0154] That is, for example, horizontal x length considers the block which consists of 8x8 pixels about a reference image, and the pixel value of the pixel which is rightward downward by the i-th in the j-th location is now expressed as Ri and j from on the leftmost of the block. Furthermore, a x axis or the y-axis is considered from on the leftmost to the right or down about the image for coding, respectively, and the pixel value of the pixel which is downward in the j-th

location is expressed rightward as Sx+i and y+j in the i-th from on the leftmost of the block which makes a point (x y) the pixel of most the upper left.

[0155] in this case, d (x y) shown by the degree type in the motion detector 120 -- x and y -- each is changed every [1] and it asks.

[0156]

[Equation 2]

... (3)

[0157] and -- the motion detector 120 -- d (x y) of a formula (3) -- min -- carrying out (x y) -- it detects as a motion vector -- having -- further -- the minimum d (x y) -- difference -- it is computed as the absolute value sum AD.

[0158] the difference of the block unit which moves by the image weighting network 130 as mentioned above, and is searched for with a detector 120 in it -- the absolute value sum AD -- using -- a degree type -- following -- difference -- the total SAD of the absolute value sum is called for as the 2nd parameter.

[0159] SAD=sigma AD ... (4)

However, also in a formula (4), sigma expresses the summation about all blocks

that constitute an image.

[0160] in addition, the difference expressed with a formula (3) in the image weighting network 130 -- total in the macro block unit of the absolute value sum AD is also called for. This is used for the decision of whether each macro block performed in the compression approach selection circuitry 132 is encoded in a frame, or to carry out interframe coding (forward prediction coding, backward prediction coding, or both-directions predicting coding) etc.

[0161] The 1st Parameter SMAD and 2nd parameter SAD calculated in the image weighting network 130 are supplied to the scene change detector 131, the compression approach selection circuitry 132, and the quantization step controller 119.

[0162] As mentioned above, it is detected based on the output of the image weighting network 130 whether there was any scene change, and the compression approach of an image is chosen as the evaluation value from the image weighting network 130, and a pan by the compression approach selection circuitry 132 in the scene change detector 131 using the output of the scene change detector 131 if needed. Moreover, in the quantization step controller 119, as mentioned above, a quantization step is set up.

[0163] In addition, in the scene change detector 131, for example, the ratio of 2nd parameter SAD about a continuous image is called for, and detection of whether there was any scene change is performed by the size of the ratio.

[0164] Furthermore, the scene change detector 131 is made also as [generate / the index data mentioned later]. This index data is supplied to a microprocessor 201, and is used for generating the index file mentioned later.

[0165] moreover, the average absolute value sum MAD supplied from the image weighting network 130 about P picture and B picture in the compression approach selection circuitry 132, for example and difference -- total in a macro block unit with the absolute value sum AD is compared, and it is determined based on those size relation whether to encode a macro block in a frame or carry out interframe coding. namely, the direction of the total of the average absolute value sum MAD about a macro block -- difference -- it is smaller than total of the absolute value sum AD, therefore when the direction which performed coding in a frame is expected that the amount of generating signs decreases, performing coding in a frame is chosen. moreover, the direction of total of the average absolute value sum MAD -- difference -- it is larger than total of the absolute value sum AD, therefore when the direction which performed

interframe coding is expected that the amount of generating signs decreases, performing interframe coding is chosen.

[0166] In addition, in drawing 6 , the controller 133 is supervising the amount of data of the data which the output buffer 118 has memorized, and is made as [control / the encoding processing in the encoder board 213] corresponding to the amount of data. About this, it mentions later.

[0167] Next, "Slipclip" currently recorded on the hard disk 212 as an application program for video work is explained.

[0168] If the power button 34 of a body 31 is operated and a power source is turned ON, as mentioned above, Windows 95 will start at the operating system currently recorded on the hard disk 212, i.e., here. A click of the [start] carbon button of the taskbar displays a [start] menu after starting of Windows 95.

[0169] With the gestalt of this operation, there is [VAIO] as one of the items of a [start] menu, and the predetermined application which contains "Slipclip" in it is registered.

[0170] As "Slipclip" was mentioned above, it consists of a "slip recorder", a "clip editor", a "clip viewer", a "video CD creator", and a "video CD copy tool", and the five application programs are registered into [Slipclip] in [VAIO]. Therefore, if a

mouse 22 is operated and an item [Slipclip] is clicked, a [slip recorder], a [clip editor], a [clip viewer], a [video CD creator], and five items of a [video CD copy tool] will be displayed.

[0171] And if a user clicks one of items according to the activity purpose, the application program corresponding to the item will be started.

[0172] For example, the material used for work of a video CD is photoed with a video camera 214, and a "slip recorder" is started, when incorporating it (it records), or when recording simply like the case where a television broadcasting program is recorded on videotape with VTR216 etc. The slip recorder main window 301 as shown in drawing 7 in this case is displayed.

[0173] The slip recorder main window 301 consists of various kinds of displays and a carbon button.

[0174] That is, an image transcription condition is displayed in the image transcription indicator 302. Image transcription reservation will be carried out and, specifically, the display of the image transcription indicator 302 will be "TIMER" in the condition of waiting for initiation of an image transcription. Moreover, in the condition of making timed recording, the display of the image transcription indicator 302 will be "TEMER REC." Furthermore, when an image

transcription is started by operating the image transcription carbon button 309, the display of the image transcription indicator 302 will be "REC." Moreover, when the pause carbon button 310 or an earth switch 308 is operated and an image transcription is suspended or suspended, the display of the image transcription indicator 302 will be "PAUSE" or "STOP", respectively, for example.

[0175] The scene change indicator 303 is carrying out the configuration of a flag, and only when the scene change of the image currently recorded on videotape is detected, it is displayed. That is, only fixed time amount will be displayed and, thereby, the scene change indicator 303 will tell a user about a scene change, if it is not usually displayed but a scene change is detected.

[0176] Current time is displayed on the current time display 304 by the so-called 24-hour military method. Here, the time of day managed at [the date and time of day] in the control panel of Windows 95 is displayed as it is, for example.

[0177] The elapsed time after starting an image transcription in the image transcription time amount display 305, or the residual time (or residual time to the last of the tape mentioned later) to image transcription termination is displayed. It is switched by operating the image transcription time amount display modification carbon button (the TIME carbon button) 311 whether which

time amount is displayed. In addition, when not recording on videotape, the image transcription time amount display 305 will be "00:00:00."

[0178] The condition about timed recording is displayed on the timer standby indicator 306. That is, image transcription reservation is carried out and the purport which is standing by timed recording, and the start time of timed recording are displayed in the condition of waiting for initiation of the timed recording. When standing by the timed recording from time-of-day 14:55, as shown in drawing 7 , specifically, the purport "ON" which is standing by timed recording, and start time "14:55" are displayed. Moreover, when timed recording is being made, that and its end time are displayed. When timed recording ended at time of day 21:43 is specifically being performed, the end time "21:43" is displayed as "OFF" in that.

[0179] In addition, also when image transcriptions other than timed recording (usually henceforth an image transcription suitably) are carried out and the end time is set up, the same display as the time of making timed recording is performed.

[0180] moreover, end time is not set up -- usually -- under an image transcription -- the display of the timer standby indicator 306 -- for example, -- "-- : -- " -- it

becomes.

[0181] Furthermore, in other than an above-mentioned case, nothing is displayed by the timer standby indicator 306.

[0182] The display corresponding to the class of tape mentioned later is made by endless image transcription display 307A. That is, when the class of tape is "endless", endless image transcription display 307A is set to "E" as shown in drawing 7 . Moreover, when the class of tape is "Normal", nothing is displayed on endless image transcription display 307A.

[0183] The input chosen as an object of an image transcription is displayed on input source display 307B. That is, when the input from the AV terminal area 84 of the tooth back of a body 31 or the input from the front AV terminal area 43 is chosen, input source display 307B is set to "Video 1" or "Video 2", respectively. Moreover, when the output of TV tuner 213A is chosen, input source display 307B becomes "TV-O." In addition, the channel chosen by TV tuner 213A is displayed on the part of O mark. In drawing 7 , the program which input source display 307B is "TV-1", therefore is broadcast by one channel as an object of an image transcription is chosen.

[0184] An earth switch 308, the image transcription carbon button 309, or the

pause carbon button 310 is operated, respectively, when suspending an image transcription and starting an image transcription, or when suspending an image transcription. In addition, when the pause carbon button 310 is operated (click) and an image transcription is made to suspend, an image transcription can be resumed by operating the pause carbon button 310 once again.

[0185] The image transcription time amount display modification carbon button 311 is operated when changing the image transcription time amount display 305, as mentioned above. In addition, whenever it operates the image transcription time amount display modification carbon button 311, in the image transcription time amount display 305, elapsed time and residual time are displayed by turns.

[0186] The input change-over carbon button (the INPUT carbon button) 312 is operated when switching the input as a candidate for an image transcription. Namely, actuation of the input change-over carbon button 312 chooses the input from the AV terminal area 84 of the tooth back of a body 31, the input from the front AV terminal area 43, and the output of TV tuner 213A in round so to speak for the actuation of every. Input source display 307B is also changed according to actuation of this input change-over carbon button 312.

[0187] The up-and-down carbon button 313 is operated, when the output of TV

tuner 213A is chosen as an input and the channel is changed into the following channel currently displayed on the channel carbon button 314, or a front channel from the channel by which current selection is made. The channel carbon button 314 is operated, when the output of TV tuner 213A is chosen as an input and the channel is chosen. In addition, the display of the figure (channel) of the channel carbon button 314 is made in the item [a channel setup] in the [option] menu of the slip recorder main window 301 as [set / it / as the channel of the arbitration of the range of 1 thru/or 62].

[0188] In the condition that the slip recorder main window 301 constituted as mentioned above is displayed For example, while operating the input change-over carbon button 312 (operating the up-and-down carbon button 312 or the channel carbon button 314 further if needed) and choosing an input Although the image transcription of the image (and voice which accompanies it) as a selected input is started by operating the image transcription carbon button 309, to perform the image transcription by the "slip recorder", it is necessary to set up the tape used for the image transcription.

[0189] That is, although it is recorded on a hard disk 212 after the image for an image transcription will be encoded by actuation of the image transcription

carbon button 309 etc. on the encoder board 213 and it will consider as coded data, if the image transcription was directed, in having recorded the coded data on the hard disk 212 simply, there is a case where it becomes impossible to record on videotape, without the availability of a hard disk 212 being lacking.

[0190] In a place, with VTR etc., when recording on videotape on a video tape, it can record on videotape freely from the head of the video tape before the end. The storage capacity of only the part of a video tape can consider that it is beforehand secured by this.

[0191] Then, also by "Slipclip", the record section (suitably henceforth a need field) more than storage capacity (necessary minimum storage capacity for making it an image transcription not completed on the way, when the availability of a hard disk 212 is lost) (suitably henceforth need capacity) required to record on videotape normally is secured to a hard disk 212, and coded data etc. is recorded on the need field.

[0192] Namely, the file of magnitude required with the gestalt of this operation to record the MPEG system stream obtained as a result of MPEG encoding on the encoder board 213 on the occasion of the image transcription of an image The file of magnitude required to record [(it is hereafter called an MPEG file suitably)

and] the index mentioned later (It is hereafter called an index file suitably) is generated, this is made as [record / on a hard disk 212], and, thereby, a field required for record of coded data (MPEG system stream) etc. is beforehand secured to a hard disk 212.

[0193] That is, the MPEG file and index file of magnitude more than a need capacitive component are written in the free area of a hard disk 212.

[0194] Here, since they are equivalent to preparing a new video tape when especially semantics does not have the MPEG file and index file immediately after writing in a hard disk 212 in the contents, therefore it records on videotape with VTR, they are called a tape by the "slip recorder."

[0195] It is made as [perform / a setup of this tape / in the tape setting dialog box 321 as shown in drawing 8].

[0196] That is, as one of the items in [edit] menu displayed on the upper part of the slip recorder main window 301 (drawing 7), there is [a reference tape setup] and the tape setting dialog box 321 is displayed by clicking that.

[0197] The identifier name a tape is inputted into the column 322 of an identifier in the tape setting dialog box 321. "Tape" is inputted with the gestalt of operation of drawing 8 . Here, let the identifier inputted into the column 322 of an identifier

be the file name of the MPEG file which constitutes the tape, and an index file. In addition, when it is made by the extension of an MPEG file or an index file as [use /, respectively / MPG or SCX], for example, therefore "Tape" is inputted into the column 322 of an identifier as an identifier of a tape, the file name of the MPEG file which constitutes the tape, or an index file serves as Tape.MPG or Tape.SCX fundamentally, respectively.

[0198] The write-protected check box 323 is checked when forbidding the writing to a tape. The class of tape is set to the column 324 of a class.

[0199] Here, by the "slip recorder", two, "Normal" (normal tape) and endless ["endless" (endless tape)], are prepared as a class of tape.

[0200] When a normal tape is chosen, although a part for the image transcription time amount set as the column 325 of the image transcription time amount mentioned later is recorded, the MPEG file and index file as a necessary minimum tape are created. That is, when 1 hour is set as the column 325 of image transcription time amount as image transcription time amount, as shown in drawing 9 (A), the tape which can record for 1 hour is created.

[0201] On the other hand, when an endless tape is chosen, the tape (suitably henceforth a fixed tape) which can record on videotape as image transcription

time amount of immobilization (for example, 15 minutes) is created as it becomes more than the image transcription time amount part by which the image transcription time amount of the whole was set as the column 325 of image transcription time amount. That is, only the number which added 1 to the quotient into which the tape which can record 15 minutes on videotape divided the image transcription time amount (set up per 15 minutes with the gestalt of this operation so that it may mention later) set as the column 325 of image transcription time amount in 15 minutes is created here. When 1 hour is set as the column 325 of image transcription time amount as image transcription time amount, as shown in drawing 9 (B), specifically, five fixed tapes are created (therefore, the tape which can record 15 minutes per hour on videotape is created).

[0202] Here, although a normal tape consists of every one MPEG file and index file, an endless tape may consist of two or more MPEG files and index files from having mentioned above. For this reason, the file name which gave notation # and consecutive numbers to the identifier of a tape is given to the MPEG file and index file which constitute an endless tape.

[0203] Namely, although an MPEG file and five index files are created at a time,

respectively when shown in drawing 9 (B) Each file name from the tape of the head It is referred to as Tape#1.MPG, Tape#1.SCX and Tape#2.MPG, Tape#2.SCX and Tape#3.MPG, Tape#3.SCX and Tape#4.MPG, Tape#4.SCX and Tape#5.MPG, and Tape#5.SCX.

[0204] It is started from the head, and the record over a normal tape is ended when the end is reached. In addition, when a halt of record is directed before reaching the end, record is ended at the time. In this case, the part in which record of an MPEG file and an index file is not made is canceled (released as a free area).

[0205] On the other hand, the record over an endless tape is started from the head of the fixed tape of the beginning of two or more fixed tapes. And if the first fixed end of tape is reached, record on the first fixed tape will be ended, and record on the 2nd fixed tape will be started. If record on the 3rd, the 4th, ..., the last fixed tape is performed one by one and reaches the last fixed end of tape similarly hereafter, record (overwrite) on the first fixed tape will be performed again.

[0206] That is, so to speak, such round-record is continued by endless until record on the 1st fixed tape is started and it is again ordered in termination of

record, after the record over 1 thru/or all the 5th fixed tapes is completed when shown in drawing 9 (B) (until an earth switch 308 is operated).

[0207] And if ordered in termination of record, record will be ended at the time. In this case, let in "Slipclip" the range where only the image transcription time amount set as the column 325 of image transcription time amount went back from the time of record being completed be the refreshable range.

[0208] That is, when the record for 10 minutes was made to the 5th fixed tape and it is ordered in termination of record in drawing 9 (B) for example, as a slash is attached and shown in this drawing, let a part for 1 hour from the location for 10 minutes of the 1st fixed tape (beginning) to the location for 10 minutes of the 5th fixed tape be the refreshable range.

[0209] In addition, although each should be canceled from a viewpoint of efficient use of a hard disk 212 in this case since all range from the head of the 1st fixed tape to the location for 10 minutes and range from the location for 10 minutes of the 5th fixed tape to an end are refreshable range Here, only the range from the location for 10 minutes of the 5th fixed tape to an end is canceled, and the range from the head of the 1st fixed tape to the location for 10 minutes is not canceled. This is based on the following reasons.

[0210] That is, it is because decoding will become difficult if such a head part is canceled, since information required to decode the data in which a system header and others carried out MPEG encoding in the head of the MPEG file which constitutes a fixed tape is arranged.

[0211] Therefore, about the range from the head of the 1st fixed tape to the location for 10 minutes, if direct access is carried out to the MPEG file which constitutes the fixed tape, the playback is possible.

[0212] In addition, when an endless tape is not constituted from two or more fixed tapes, but is constituted from a tape of 1 as well as a normal tape as mentioned above and endless is chosen as a class of tape, after starting record from the head of a tape and reaching the end, how to repeat the record (overwrite) from the head can be considered again. However, as mentioned above, decoding will become difficult if it overwrites there, since a system header etc. is written in the head part of an MPEG file. Therefore, as for an endless tape, it is desirable to constitute from two or more fixed tapes.

[0213] The image transcription time amount (chart lasting time) which records on videotape is inputted into drawing 8 at the column 325 of return and image transcription time amount. Here, it is made as [set / it / till 12 hours] at the

maximum, for example per 15 minutes. In addition, image transcription time amount is divided into time amount and a part, and is inputted.

[0214] The auto-index check box 326 is checked when the index as a mark showing the location of the scene change of an image to the time of an image transcription is attached automatically. A scene change pointer, a scene change parameter, etc. which are later mentioned when the auto-index check box 326 is not checked are not recorded on an index file.

[0215] Image transcription mode (bit rate information) is set to the column 327 in image transcription mode. Here, four image transcription modes, "High", "Normal", "Long", and "Network", are prepared for order with a high bit rate.

[0216] Here, the time amount which can be recorded on videotape to drawing 10 on the size (the number of pixels of horizontal number of pixels x length) of the frame about each image transcription mode, the bit rate (system bit rate) of the system stream obtained as a result of MPEG encoding, the bit rate (video rate) of the MPEG encoding result of an image, a frame rate, the bit rate (audio bit rate) of an audio MPEG encoding result, the sound recording mode that can be set up, and 1GB of tape is shown.

[0217] Although the image transcription time amount over the tape of the same

storage capacity becomes the shortest in image transcription mode "High", a high-definition decode image can be obtained. In image transcription mode "Normal", as mentioned above, the system stream based on the specification of a video CD (VCD) can be obtained. Although image transcription mode "Long" does not need for example so high-definition a decode image, when recording long duration on videotape comparatively, it is suitable. The bit rate is made into the transmission possible value on real time by ISDN (Integrated Services Digtal Network), and image transcription mode "Network" is suitable when performing such transmission.

[0218] In addition, the number of pixels which constitutes one frame in image transcription mode "Long" as compared with image transcription mode "High" and "Normal" has become about 1/4, and it has decreased further in image transcription mode "Network." Moreover, although the frame number for 1 second (frame rate) is 30 frames in image transcription mode "High", "Normal", and "Long", they are ten frames of 1/the 3 in image transcription mode "Network."

[0219] Again, sound recording mode is set as drawing 8 by the column 328 in return and sound recording mode. Here, two channels (dual), a stereo (stereo),

and three sound recording modes of a monophonic recording (single) are prepared.

[0220] In addition, as image transcription mode, as shown in drawing 10 , when "High" or "Long" is set up, sound recording mode is made selectable [either two channels or the stereos] here. Moreover, as image transcription mode, when "Normal" is set up, sound recording mode is fixed to two channels. Furthermore, as image transcription mode, when "Network" is set up, image transcription mode is fixed to a monophonic recording.

[0221] The automatic check box 329 of a clip creation folder is checked when making the folder which creates a clip into what is set up beforehand. Here, with a clip, it consists of 1 set of MPEG files, and an index file. That is, the group of an MPEG file and an index file is called a tape by the "slip recorder", and is called a clip with a "clip editor" and a "clip viewer." In addition, when a tape is a normal tape, the clip and the tape are synonymous, but when a tape is an endless tape, a tape may correspond to two or more clips (two or more sets of MPEG files, and index file).

[0222] The reference carbon button 330 of a clip creation folder is operated when specifying the folder which creates a clip.

[0223] The size of the decode image in the case of performing encoding by the image transcription mode set as the column 327 in image transcription mode, a frame rate, a video bit rate, an audio bit rate, etc. are displayed on the informational column 331. That is, the size shown in drawing 10 is displayed corresponding to image transcription mode.

[0224] Furthermore, encoding by the image transcription mode set as the column 327 in image transcription mode is performed, and when only the image transcription time amount set as the column 325 of image transcription time amount records the MPEG system stream obtained as a result, the magnitude (storage capacity) (disk field) of the tape secured to a hard disk 212 is also displayed on the informational column 331.

[0225] Here, count of the magnitude of a tape is performed as follows, for example.

[0226] That is, the multiplication of the image transcription time amount set as the column 325 of image transcription time amount is carried out to the system bit rate in the image transcription mode set as the column 327 in image transcription mode, and, thereby, the size of an MPEG file is called for. Furthermore, let 0.1% of size of an MPEG file be the size of an index file. And let

the aggregate value of the size of the MPEG file, and the size of an index file be the magnitude of a tape.

[0227] In addition, the value about image transcription mode "Normal" with the system bit rate in each image transcription mode smaller than the system bit rate (1,411,200bps) shown in drawing 10 although the value fundamentally shown in drawing 10 is used is used. That is, the system bit rate in the image transcription mode "Normal" in drawing 10 expresses the value when recording an MPEG system stream on a video CD, and this serves as a bit rate (bit rate specified to the specification of a video CD) of the bit stream which added the sink specified to the specification of a video CD, the header, etc. to the pack which constitutes an MPEG system stream. When recording an MPEG system stream on a hard disk 212, such a sink, a header, etc. are unnecessary and he is trying not to record such unnecessary data on a hard disk 21 from a viewpoint of a deployment of a hard disk 212 further here.

[0228] Therefore, about image transcription mode "Normal", it is made as [calculate / the magnitude of a tape] using 1,394,400bps which is the bit rate of the MPEG system stream which consists of only packs.

[0229] With the gestalt of operation of drawing 8 , "Normal" is set up as image

transcription mode and, specifically, "1 hour" is set up as image transcription time amount. Here, if the class of tape is "Normal", the increase of 0.1% of the value acquired by carrying out the multiplication of the 1 hour which is image transcription time amount to 1,394,400bps which is a bit rate will become the magnitude of a tape. However, in drawing 8 , "endless" is set up as a class of tape. Since the image transcription time amount about an endless tape was mentioned above, it increases more than the image transcription time amount set as the column 325 of image transcription time amount for 15 minutes. For this reason, the increase of 0.1% of the value acquired by carrying out the multiplication of the 15 minutes per hour which is image transcription time amount to 1,394,400bps which is a bit rate, i.e., 748.76MB, becomes the magnitude of a tape. In drawing 8 , this value is displayed on the informational column 331.

[0230] The O.K. carbon button 332 decides the setting matter in the tape setting dialog box 321 to that into which it was newly inputted, and when closing the tape setting dialog box 321, it is operated. Cancel button 333 holds the setting matter in the tape setting dialog box 321 in the condition of having been decided last time, and when closing the tape setting dialog box 321, it is operated. A help

button 334 is operated when displaying the explanation (help) about the tape setting dialog box 321.

[0231] Next, with reference to the flow chart of drawing 11 and drawing 12 , the image transcription processing by the "slip recorder" is explained.

[0232] First, when recording on videotape, as mentioned above, a user opens the tape setting dialog box 321 (drawing 8), and sets up the tape.

[0233] And for example, in recording a television broadcasting program on videotape, the input change-over carbon button 312 of the slip recorder main window 301 (drawing 7) is operated, and it chooses the output of TV tuner 213A (drawing 5) as an input. Furthermore, the up-and-down carbon button 313 or the channel carbon button 314 is operated, and the channel of the program recorded on videotape is chosen.

[0234] Moreover, in, recording on videotape the image (and voice which accompanies it) recorded on videotape with the video camera 214 for example, (dubbing), it connects the image output terminal and voice output terminal (not shown) of a video camera 214 with the AV terminal area 84 of the tooth back of a body 31, or the front AV terminal area 43. And the input change-over carbon button 312 is operated, and the input from the AV terminal areas 84 or 43 is

chosen as an input.

[0235] A user's actuation of the image transcription carbon button 309 of the slip recorder main window 301 performs image transcription processing according to the flow chart of drawing 11 or drawing 12 by the microprocessor 1 after the above activity.

[0236] That is, as a tape used for an image transcription, when the normal tape is set up, as shown in the flow chart of drawing 11 , in step S1, it is judged first whether creation of a tape is possible.

[0237] Here, a tape, i.e., a record section required for an image transcription, is not secured to a hard disk 212 only by a setup of a tape being performed in the tape setting dialog box 321. That is, the image transcription carbon button 309 is operated, and reservation of a tape is performed after initiation of an image transcription is directed. This is because it is not desirable from a viewpoint of efficient use of a hard disk 212 to secure a tape before an image transcription is started.

[0238] Moreover, it is carried out because the judgment processing in step S1 checks whether it is calculated as the magnitude of a tape mentioned above, and the record section of the magnitude can secure a hard disk 212.

[0239] In step S1, when judged with creation of a tape not being possible (i.e., when there is only no availability which secures the set-up tape in a hard disk 212), that is displayed and image transcription processing is ended. Therefore, an image transcription is not performed in this case.

[0240] Moreover, in step S1, when judged with creation of a tape being possible (i.e., when the MPEG file and index file which constitute the set-up tape can be written in a hard disk 212), it progresses to step S2 and the MPEG file and index file are written in a hard disk 212. In addition, as mentioned above, meaningful information is not written especially in the MPEG file and index file at this time.

[0241] Then, it progresses to step S3, and it is opened by the MPEG file as a tape and progresses to step S4. In step S4, the encoder board 213 is controlled and, thereby, MPEG encoding for an image transcription is performed in the encoder board 213 so that the input chosen by operating the input change-over carbon button 312 may be encoded.

[0242] And it progresses to step S5, and the MPEG system stream obtained as a result of MPEG encoding is transmitted to a hard disk 212, and is written in the MPEG file secured at step S2. Then, it is judged by having progressed to step S6, and having written in the MPEG system stream to the MPEG end of file, or

operating an earth switch 308 whether termination of an image transcription was directed. In step S6, when it judges that it is not written in by the MPEG system stream to an MPEG end of file and it is judged as the earth switch 308 not being operated, encoding and record return and for an image transcription are continued by step S4.

[0243] Moreover, in step S6, when judged with termination of an image transcription having been directed by being judged with the MPEG system stream having been written in to the MPEG end of file, or operating an earth switch 308, it progresses to step S7, an MPEG file is closed, and image transcription processing is ended.

[0244] Next, image transcription processing which the tape used for an image transcription followed at the flow chart of drawing 12 in the case of the endless tape is performed.

[0245] That is, at steps S11 or S12, the respectively same processing as steps S1 or S2 of drawing 11 is performed. In addition, at step S12, as mentioned above, the endless tape which consists of two or more fixed tapes (drawing 9 (B)) is created.

[0246] After processing of step S12 progresses to step S13, is opened by the

MPEG file in the first fixed tape (1st fixed tape) which constitutes an endless tape, and progresses to step S14. At step S14, the encoder board 213 is controlled and, thereby, MPEG encoding for an image transcription is performed in the encoder board 213 so that the input chosen by operating the input change-over carbon button 312 may be encoded.

[0247] And it progresses to step S15, and the MPEG system stream obtained as a result of MPEG encoding is transmitted to a hard disk 212, and is written in an MPEG file. Then, it is judged by progressing to step S16, for example, operating an earth switch 308 whether termination of an image transcription was directed. **** [termination of an image transcription is directed and] in step S16 -- ** -- when judged, it progresses to step S17 and it is judged whether the MPEG system stream was written in to the MPEG end of file which constitutes a fixed tape. In step S17, when it judges that it is not written in by the MPEG system to the MPEG end of file which constitutes a fixed tape, encoding and record return and for an image transcription are continued by step S14.

[0248] Moreover, in step S17, when it judges that it was written in by the MPEG system stream to the MPEG end of file which constitutes a fixed tape, it progresses to step S18, and the MPEG file is closed and it progresses to step

S19. At step S19, it is opened by the MPEG file which constitutes the following fixed tape, and progresses to step S14. Therefore, an MPEG system stream is written in after this to the MPEG file which constitutes that following fixed tape.

[0249] In addition, when an MPEG system stream is written in to the MPEG end of file which constitutes the last fixed tape, at step S19, it is again opened by the MPEG file which constitutes the first fixed tape, and the MPEG system stream is overwritten there. Therefore, in step S16, the MPEG system stream is endlessly written in until it is judged with termination of an image transcription having been directed.

[0250] And for example, if an earth switch 308 is operated, in step S16, it will be judged with termination of an image transcription having been directed. In this case, the MPEG file which progresses to step S20 and is opened is closed, and image transcription processing is ended.

[0251] Next, although an MPEG system stream is recorded on the MPEG file which constitutes a tape as mentioned above at the time of an image transcription, predetermined data are recorded also on the index file which constitutes that tape in coincidence at this time.

[0252] The flow chart of drawing 13 shows the index record processing which

records data on an index file.

[0253] If an image transcription is started, first, it will be opened by the index file, the header by which the time of day (current time when starting an image transcription) (suitably henceforth start time) when the image transcription was started, image transcription mode (what was set up by the tape setting dialog box 321 (drawing 8)), etc. have been arranged will be recorded in step S30, and it will progress to step S31. At step S31, when it is judged [being judged by the microprocessor 201 and not having been transmitted and] whether index data have been transmitted from the scene change detector 131 (drawing 6) of the encoder board 213, it skips step S32 thru/or S38, and progresses to step S39.

[0254] Moreover, in step S31, when judged with index data having been transmitted from the scene change detector 131 (drawing 6), a microprocessor 201 receives the index data and progresses to step S32.

[0255] Here, drawing 14 shows the example of a format of the index data which the scene change detector 131 outputs.

[0256] As shown in this drawing, index data consist of a total of 32 bits by which sequential arrangement of the field which is 4 bits by which various kinds of flags

have been arranged, and the field which is 28 bits by which the 2nd parameter SAD explained by the formula (4) has been arranged was carried out. What expresses as a flag the picture type of the frame set as the count object of the 2nd parameter SAD, for example (suitably henceforth a picture type flag), the thing (suitably henceforth a scene change flag) showing the existence of detection of the scene change in the scene change detector 131, etc. are arranged.

[0257] At return and step S32, it is judged by drawing 13 in a microprocessor 201 whether the index data received from the scene change detector 131 are a thing about I picture or P picture. In addition, this judgment is performed with reference to the picture type flag arranged for example, at index data.

[0258] In step S32, when it judges that it is not a thing about I picture, either and index data are not a thing about P picture, either (i.e., when it is a thing about B picture), step S33 thru/or S38 are skipped, and it progresses to step S39. Moreover, in step S32, when it judges that index data are a thing about the thing about I picture, or P picture, it progresses to step S33 and it is judged by the microprocessor 201 in the I picture or P picture whether the scene change was detected. In addition, this judgment is performed with reference to the scene

change flag arranged for example, at index data.

[0259] In step S33, when judged with the scene change not being detected, step S34 thru/or S37 are skipped, and it progresses to step S38. Moreover, in step S33, when judged with the scene change having been detected, it progresses to step S34 and a microprocessor 201 computes a scene change parameter. That is, a microprocessor 201 does the division of the SAD arranged at the index data received this time by the last SAD memorized at step S38 mentioned later, and makes the division result a scene change parameter.

[0260] Here, this scene change parameter expresses the degree (extent from which the screen has switched) of a scene change, and it serves as a big value, so that that degree is large. In addition, a scene change parameter can also adopt other physical quantity which is not limited to an above-mentioned thing and expresses the degree of a scene change.

[0261] After calculation of a scene change parameter, it progresses to step S35 and it is judged in a microprocessor 201 whether the scene change parameter is larger than the predetermined thresholds epsilon (for example, 3 etc.). In step S35, when it judges that a scene change parameter is not larger than the predetermined threshold epsilon, steps S36 and S37 are skipped, and it

progresses to step S38.

[0262] Moreover, in step S35, when it judges that a scene change parameter is larger than the predetermined threshold epsilon, it progresses to step S36, the scene change pointer as positional information about the location where the coded data of the frame with which the scene change parameter expresses the degree of a scene change was written in the MPEG file is called for, and it is matched with a scene change parameter. Furthermore, the discernment flag mentioned later is added to these, and it is written in them at an index file.

[0263] In addition, as a scene change pointer, coded data can adopt the cutting tool position showing in what byte it is written from the head of an MPEG file etc., for example.

[0264] Here, what added the discernment flag to the scene change parameter and the scene change pointer is hereafter called index suitably. An index plays a role of a mark showing the location of a scene change of an image.

[0265] In addition, the index attached by the microprocessor 201 at the time of an image transcription (written in an index file) is called auto-index as mentioned above. The index which could also attach the index when a user did predetermined actuation, and was attached by the user is called a manual index.

An index expresses auto-index or a manual index, for example, an above-mentioned discernment flag is a 1-bit flag.

[0266] After processing of step S36, it progresses to step S37, and only time amount predetermined in the scene change indicator 303 of the slip recorder main window 301 (drawing 7) is displayed, and, thereby, it is reported that the scene change was detected by the user. And it progresses to step S38, and SAD arranged at the index data received this time replaces with SAD memorized last time, main memory 202 memorizes, and it progresses to step S39. At step S39, when it judges that it is not judged and ended by whether record of the MPEG system stream to an MPEG file was ended, it repeats the same processing return and the following to step S31.

[0267] Moreover, in step S39, when judged with record of the MPEG system stream to an MPEG file having been ended, an index file is closed and index record processing is ended.

[0268] Although he is trying to record an index with it here only when a scene change parameter is larger than the predetermined threshold epsilon when the scene change flag means that the scene change was detected in the scene change detector 131 in the gestalt of operation of drawing 13 , record of an index

can also be carried out regardless of the magnitude of a scene change parameter. However, an index will be given also to the frame which does not have a so big change in this case, consequently the number of indexes will increase.

[0269] Next, it is convenient the midst if the scene of the arbitration of an image [finishing / an image transcription / already] is reproducible to the midst which is recording on videotape the image (and voice which accompanies it). That is, when it is looking away during the image transcription and a certain scene is overlooked for example, it is convenient if reproducible by going back to the scene.

[0270] Then, it is made as [perform / playback of the scene of the arbitration of an image / finishing / an image transcription / already], without interrupting an image transcription for a "slip recorder", recording on videotape an image (and voice which accompanies it), as mentioned above. Here, such playback is hereafter called slip playback suitably.

[0271] When performing slip playback, a user chooses an item [a slip] from [playback] menu in the upper part of the slip recorder main window 301 of drawing 7 . The playback window 341 as shown in drawing 15 in this case is

displayed.

[0272] In the playback window 341, the reproduced image is displayed on the image display column 342. A current playback condition is displayed on the playback indicator 343. namely, for example, under playback -- "PLAY" -- under a halt -- "PAUSE" -- under a halt -- "STOP" -- under slow playback -- "R. SKIP" is displayed ["SLOW"] for "F. SKIP" on the playback indicator 343 during a hard flow skip during a forward direction skip, respectively.

[0273] In the playback time amount display 344, as shown in drawing 16 , from the time of day (start time) when the image transcription was started The elapsed time to the location (suitably henceforth the playback point) set as the object of slip playback, Residual time of a before [from the playback point / the location (suitably henceforth the image transcription point) used as the candidate for an image transcription] (however, on a tape [finishing / an image transcription]) The hour entry of either of the time of day (suitably henceforth image transcription time of day) when the image (coded data) in the time amount or the playback point to a end of tape is recorded on videotape is displayed. It is made as [choose / whether which hour entry is displayed / by operating the playback time amount display modification carbon button 353].

[0274] Here, when slip playback is performed, unless it operates the slider 354 which mentions the playback point later and moves, the relative physical relationship (distance of the playback point and the image transcription point) of the playback point and the image transcription point does not change. Therefore, when residual time is chosen as a hour entry in the playback time amount display 344 at the time of slip playback, the display of the residual time will be that it is fixed (time amount equivalent to the distance of the playback point and the image transcription point) (almost fixed).

[0275] In addition, the playback window 341 is opened, not only when slip playback is directed, but when having carried out the monitor of the input chosen by operating the input change-over carbon button 312 of the slip recorder main window 301 was directed, or also when playing the tape which the image transcription ended is directed. the case where it is opened by the playback window 341 for a monitor -- the playback time amount display 344 -- "-- : -- : -- " -- it becomes. Moreover, when are opened by the playback window 341 for playback of the tape which the image transcription ended and residual time is chosen as a hour entry displayed on the playback time amount display 344, the time amount of a before [from the playback point / a end of tape] is displayed.

[0276] Voice mode current to the voice mode display 345 is displayed. There are three kinds of voice modes, the output of for example, stereo voice, the output from both the loudspeakers of right and left of only L channels, and the output from both the loudspeakers of right and left of only R channels, and it is made as [choose / it / by operating the voice change-over carbon button 357]. In addition, when the output of stereo voice, the output of only L channels, and the output of only R channels are chosen, as voice mode display 345, "STEREO", "L ONLY", and "R ONLY" are displayed, respectively, for example.

[0277] An earth switch 346, the playback carbon button 347, or a pause button 348 is operated, respectively, when suspending playback and starting playback, or when suspending playback. The skip carbon buttons 349 or 350 are operated, respectively, when performing a hard flow skip or a forward direction skip. The index carbon buttons 351 or 352 are operated, respectively, when skipping to the thing nearest to reverse or the forward direction from the playback point among the frames to which the index is given.

[0278] The playback time amount display modification carbon button 353 is operated when choosing the hour entry displayed on the playback time amount display 344. In addition, whenever the playback time amount display

modification carbon button 353 is operated, the display of the playback time amount display 344 is elapsed time -> residual time -> image transcription time-of-day -> elapsed time ->... It changes.

[0279] A slider 354 is operated when changing the playback point. That is, the slider 354 is made as [make / it / to move by dragging with a mouse 22], and the playback point is changed corresponding to the location of a slider 354. In addition, the slider 354 is made as [move / the between from the left end of the slider slot 354 to a right end]. Moreover, the right end is equivalent to the image transcription point in the location (head of an MPEG file) where, as for the left end of the slider slot 354, the image transcription was started, respectively. Therefore, a user can reproduce the screen of the arbitration during just before the screen where the image transcription is carried out now, after an image transcription is started by operating a slider 354.

[0280] However, in the encoder board 213, as mentioned above, the image before coding is stored temporarily at a frame memory 110, and an encoding result is stored temporarily at an output buffer 118. Furthermore, the writing of MPEG encoding and its encoding result takes a certain amount of time amount. For this reason, the object of slip playback becomes to the screen where only

about 10 thru/or the time amount for about 15 seconds of the screen which serves as a candidate for an image transcription now went back in fact.

[0281] A slider 354 moves, when operated by the user, and also even if it corresponds to the playback point which carries out sequential change by performing playback, it moves. Moreover, by operating the skip carbon buttons 349 and 350, the index carbon buttons 351 and 352, etc., a slider 354 is moved, also when the playback point changes.

[0282] In addition, when a slider 354 is moved and the playback point is changed, corresponding to the modification, it is made as [change / the hour entry in the playback time amount display 344].

[0283] By operating a pause button 348, the coma stepper button 355 is operated, when playback has stopped and coma delivery is carried out (when displaying the following frame on the image display column 342). The slow playback carbon button 356 is operated when performing slow playback. The voice change-over carbon button 357 is operated when switching voice mode. in addition, the voice change-over carbon button 357 is operated -- ** -- alike -- voice mode -- for example, output ->L channel output [of output ->R channel output -> stereo voice] -> of stereo voice -- it changes like ...

[0284] Next, the slip regeneration by the "slip recorder" is explained with reference to the flow chart of drawing 17 .

[0285] If slip playback is directed (command) and it is opened by the playback window 341, in step S40, a microprocessor 201 will read an MPEG system stream from the head of the MPEG file which constitutes the tape on which writing is carried out now. And it is the application program (it is performing MPEG1 software decoder 201A (drawing 18) mentioned later, and the MPEG system stream read at step S40 is decoded.) which progresses to step S41 and performs MPEG decoding to which the microprocessor 201 is recorded on the hard disk 212. This decoding result is outputted in step S42. That is, in step S42, the image of the decoding results is displayed on the image display column 342 of the playback window 341, and the voice of the decoding results is outputted from loudspeakers 59 and 60.

[0286] And it progresses to step S43 and the hour entry corresponding to the location of the MPEG system stream read to the playback time amount display 344 of the playback window 341 at step S40 is displayed. Here, what is chosen as a hour entry by operating the playback time amount display modification carbon button 353 three above-mentioned kinds of inside is displayed. Moreover,

a hour entry is searched for as follows in a microprocessor 201.

[0287] That is, since an MPEG system stream is a fixed rate as mentioned above, the elapsed time corresponding to the location of the MPEG system stream read at step S40 can be found with the record location (on what byte are recorded from the head of an MPEG file?) of the MPEG system stream. Moreover, residual time can be found by the byte count from the location of the MPEG system stream read at step S40 to the location of an MPEG system stream where record is carried out now. Furthermore, since the start time of an image transcription is recorded on the head of the index file which constitutes a tape as mentioned above, it can ask for image transcription time of day by adding elapsed time to the start time.

[0288] In addition, the hour entry in each location of the MPEG system stream recorded on the MPEG file is searched for as mentioned above, and also the image transcription time of day in each location is recorded, and it can also be made to ask from the image transcription time of day for example.

[0289] After processing of step S43, it is judged by the microprocessor 201 by progressing to step S44, for example, moving a slider 354 and operating the skip carbon button 349,350 and the index carbon button 351,352 etc. whether the

playback point was changed. In step S44, when judged with the playback point not being changed, a continuation of return and the MPEG system stream read last time is read from an MPEG file to step S40, and the same processing is repeated hereafter.

[0290] Moreover, in step S44, when judged with the playback point having been changed, it progresses to step S45, and the location which reads an MPEG system stream is changed corresponding to modification of the playback point, and returns from an MPEG file to step S40. In this case, at step S40, an MPEG system stream is read from that changed location, and the same processing is repeated hereafter.

[0291] In addition, slip regeneration will be ended, if the playback window 341 is closed or an earth switch 346 is operated.

[0292] As mentioned above, while recording on videotape, since the image (and voice which accompanies it) already recorded on the hard disk 212 is reproducible from the location of arbitration, a user can see a scene to see at any time, without interrupting an image transcription, continuing the image transcription.

[0293] Furthermore, since a hour entry is displayed on the playback time amount

display 344 of the playback window 341, it becomes possible comparatively quickly by seeing the hour entry to find out a desired scene.

[0294] In addition, when performing slip playback, so to speak, writing and read-out of data are performed by the hard disk 212 by time sharing. Scheduling for the writing of this data and read-out is performed here to the bottom of control of Windows 95 which is OS (operating system), for example, and especially "Slipclip" that is an application program is not involving. However, this scheduling can also be made to be carried out in an application program "Slipclip."

[0295] That is, the R/W time amount of the data in the hard disk put in practical use now is quick enough, it only carries out by data's reading to a hard disk and writing to it under I/O (Input/Output) control of OS, and slip playback can be performed fundamentally, without interrupting an image transcription.

[0296] Moreover, the image reproduced by slip playback is displayed on the image display column 342 in the playback window 341, as shown in drawing 15 , and also it can be displayed by the so-called full screen display. That is, it is possible to expand and display the image display column 342 on the whole screen of a display 51.

[0297] Next, with reference to drawing 18 , processing of a "slip recorder" is explained further.

[0298] In the image transcription processing by the "slip recorder", the MPEG system stream obtained by carrying out MPEG encoding of the image (and voice which accompanies it) is recorded on the MPEG file which constitutes the tape beforehand created by the hard disk 212 in the encoder board 213. Furthermore, a scene change parameter is computed from the index data outputted from the encoder board 213, and it is recorded on the index file which constitutes the tape beforehand created by the hard disk 212 with the scene change pointer and the discernment flag.

[0299] Here, as shown in drawing 18 , at the head of an index file, the start time which is the time of day which started the image transcription, and the header (H) by which image transcription mode etc. has been arranged are recorded.

[0300] Moreover, as are mentioned above, and the scene change flag contained in index data means that the scene change was detected and a discernment flag, a scene change pointer, and a scene change parameter show it to drawing 19 , when a scene change parameter is larger than the predetermined threshold epsilon, it is recorded. The scene change pointer recorded on the index file

expresses the location where the coded data of a frame with a scene change is recorded, as shown in drawing 18 .

[0301] On the other hand, in the slip regeneration by the "slip recorder", data are read and decoded in MPEG1 software decoder 201A realized because a microprocessor 201 performs the application program which performs MPEG decoding from the location of the arbitration of the range (part smeared away in drawing 18) where the MPEG system stream was already recorded in an MPEG file.

[0302] Here, it is made as [perform / the MPEG file is made as / open / with so-called shared one which permits access from two or more application programs /, and / file / at the time of an image transcription, / both writing of the MPEG system stream which the encoder board 213 outputs to an MPEG file by this, and read-out of the MPEG system stream to decoder 201A].

[0303] In addition, when a tape is an endless tape, as mentioned above, since it consists of two or more fixed tapes, the endless tape may be recorded on the fixed tape on which the MPEG system stream slip playback was instructed to be differs from the fixed tape (MPEG file) in which the MPEG system stream which the encoder board 213 outputs is written. In this case, it is opened by the MPEG

file on which the MPEG system stream slip playback was instructed to be is recorded apart from the MPEG file in which the MPEG system stream which the encoder board 213 outputs is written, and it is read (after termination of read-out is closed).

[0304] As mentioned above, with the gestalt of this operation, since an MPEG system stream is divided into an MPEG file, an index (a discernment flag, a scene change pointer, and scene change parameter) is divided into an index file, respectively and it was made to record, the contents of the MPEG file can be used with other applications based on the specification of MPEG therefore.

[0305] In addition, it is also possible to record an MPEG system stream and an index on the file of 1. However, it becomes difficult to use that file with other applications in this case.

[0306] Moreover, in the tape setting dialog box 321 of drawing 8 , when the auto-index check box 326 is not checked, as mentioned above, an index is not recorded on an index file. That is, an index file will consist of only headers in this case.

[0307] Here, it explains that it is possible to perform record and playback of the above images to juxtaposition. In addition, in order to set up "Normal" and to

simplify explanation as image transcription mode, count of the amount of data shall be performed not for an MPEG system stream but for a video elementary stream here.

[0308] In image transcription mode "Normal", the image of one frame consists of 352 pixel x240 pixels, as shown in drawing 10 . While each pixel is now constituted from a total of 12 bits of the 2-bit color-difference signals Cb and Cr by the 8-bit luminance signal Y and the list by 1-pixel conversion, supposing 1GOP consists of 15 frames, the amount of data (amount of data before encoding) of 1GOP will be set to 1856KB from a degree type.

[0309] 352 pixel x240 pixel x12 bit x15 frame / 8 bits = 1856KB [0310] Moreover, when image transcription mode is "Normal", the bit rate (video rate) of the video elementary stream in the encoder board 213 is 1,151,929bps, and as shown in drawing 10 , since frame rates are 30 frames per second, the image data of 1GOP (it mentioned above like [here] 15 frames) is further compressed into the amount of data shown by the degree type.

[0311] 1,151,929/30 frame x15 frame / 8 bits = 70.3KB [0312] Therefore, image data will be compressed into 1/26.4 (= 70.3KB / 1856KB) in this case.

[0313] By the way, when this artificer measured the transfer rate of a certain

HDD, it was about 4MB/second. In this case, 70.3KB of above-mentioned compressed data of 1GOP will be written in in about 17.2ms (= 70.3/(4x1024)).

[0314] Therefore, even if it considers 20ms which is quite late time amount as the head seek time of HDD, the writing of the compressed data of 1GOP can be performed in about 37.2ms (=17.2ms+20ms).

[0315] On the other hand, although the transfer rate in the case of reading the data from HDD is generally quicker than the case where data are written in, if it supposes that it is the same as that of the time of writing and the head seek time as well as an above-mentioned case is further set to 20ms, read-out of the compressed data of 1GOP from HDD can be too performed in about 37.2ms here.

[0316] Here, 1GOP consists of 15 frames, therefore is equivalent to about 0.5 seconds. And since writing and read-out of the compressed data of 1GOP can be performed in about 74.4ms (=37.2ms+37.2ms), they can perform record and playback of an image to juxtaposition between the periods (about 0.5 seconds) of 1GOP.

[0317] In addition, when image transcription mode is "Long", the amount of data (before compression) of 1GOP is 394KB, and is set to 22.9KB by encoding. That

is, about 1/is compressed into 17.2. In this case, if it considers that the specification of HDD is the same as that of an above-mentioned case, each of writing of 22.9KB of compressed data and time amount which requires for read-out will be set to about 25.6ms, and record and playback of an image can be too performed to juxtaposition between the periods (about 0.5 seconds) of 1GOP.

[0318] By the way, since Windows 95 is OS which has a multitasking feature, it may keep the writing to the hard disk 212 of an MPEG system stream waiting, and may perform other processings. Therefore, during slip playback, if a user performs actuation in which other processings are required, even if he will have set the writing to a hard disk 212 as top priority, the demanded processing may be performed. For this reason, although it is desirable during slip playback to make it have actuation in which such other processings are performed carried out, it is difficult to make such a thing fully understood among all users.

[0319] On the other hand, when the write-in waiting to the hard disk 212 of an MPEG system stream arises and the writing does not meet the deadline, an MPEG system stream fails. In this case, since that decoding becomes difficult, it is necessary to avoid the breakdown of an MPEG system stream absolutely.

[0320] Then, when it twists that the writing to the hard disk 212 of an MPEG system stream is likely to meet the deadline and becomes a situation, in the encoder board 213, it is made as [interrupt / encoding], and it is made as [perform / this control / by the controller 133 (drawing 6)].

[0321] That is, as the controller 133 was mentioned above, and the amount of data of an output buffer 118 is supervised and it is shown in the flow chart of drawing 20 , in step S51, the amount of data judges first whether it is larger than 100KB. In step S51, when it judges that the amount of data of an output buffer 118 is not larger than 100KB, it progresses to step S52, and a controller 133 usually controls each block which constitutes the encoder board 213 to carry out MPEG encoding to a passage, and returns to step S51. That is, encoding is continued when the storage capacity of an output buffer 118 is 160KB here as mentioned above, and there are 60KB or more of allowances (availability).

[0322] Moreover, in step S51, when it judges that the amount of data of an output buffer 118 is larger than 100KB, it progresses to step S53 and a controller 133 interrupts encoding processing (halt). That is, it is made not to make read-out of the image from there perform, either while making it a controller 133 not make a frame memory 110 memorize an image. Therefore, the writing of the

MPEG system stream to a hard disk 212 is kept waiting (the device driver about a hard disk 212 stopping requiring an MPEG system stream), and thereby, when the amount of data of an output buffer 118 exceeds 100KB and the allowances are set to less than 60KB, encoding is interrupted.

[0323] And it progresses to step S54 and a controller 133 judges whether the amount of data of an output buffer 118 was set to less than 50KB. In step S54, when judged with the amount of data of an output buffer 118 not being less than 50KB, it returns to step S54. Moreover, in step S54, when judged with the amount of data of an output buffer 118 having been set to less than 50KB, namely, when the amount of data of an output buffer 118 is set to less than 50KB by this by performing write-in processing to the hard disk 212 currently kept waiting, it progresses to step S55, and a controller 133 makes encoding processing resume and returns to step S51. That is, while a controller 133 makes read-out of the image from a frame memory 110 start, storage of an image there also makes it start.

[0324] As mentioned above, since it was made to interrupt encoding when it twisted that the writing to the hard disk 212 of an MPEG system stream is likely to meet the deadline and became a situation, the breakdown of an MPEG

system stream is avoidable.

[0325] In addition, since a frame memory 110 does not memorize as the image inputted into the encoder board 213 during interruption of encoding was mentioned above, the image which was not memorized will be recorded on videotape, but so much, if many compare the frame number with it being expected that it does not become, therefore an MPEG system stream failing, it will not be a big problem.

[0326] Moreover, although it was made to interrupt encoding when the allowances of an output buffer 118 were set to less than 60KB in an above-mentioned case, this is based on the following reasons. That is, interruption of MPEG encoding can be performed only per frame. Therefore, it cannot be interrupted until encoding of the frame is completed even if it is going to interrupt encoding after encoding of a certain frame is started. on the other hand in MPEG encoding, most many amounts of data occur -- intra -- the case where coding is performed -- it is -- general -- intra -- the amount of data generated by coding is expected to be about 40KB.

[0327] As mentioned above, even if it is going to interrupt encoding, about 40KB of data may be inputted into an output buffer 118, and, for this reason, it is

necessary to secure at least the availability which can memorize that data as an availability of an output buffer 118.

[0328] Then, when 20KB of margin is seen to the 40KB and the allowances of an output buffer 118 are set to less than 60KB, he is trying to interrupt encoding for the gestalt of this operation.

[0329] Next, a "clip editor" is started when editing for the image recorded on videotape by the "slip recorder." The clip editor main main window 361 as shown in drawing 21 in this case is displayed.

[0330] After the clip editor main main window 361 is displayed, the clip made applicable to edit is specified.

[0331] Here, as mentioned above, the clip and the tape are fundamentally synonymous and the clip of them is used in a "clip editor." Therefore, a clip consists of an MPEG file and an index file.

[0332] If a clip is specified, the source window 362 will be displayed into the clip editor main window 361, and the specified index screen of a clip will be displayed further.

[0333] That is, a microprocessor 201 decodes the coded data of the frame recorded on the location which the scene change pointer recorded on the index

file which constitutes the clip with which it was similarly specified in the MPEG file which constitutes the specified clip points out by MPEG1 software decoder 201A (drawing 18). And a microprocessor 201 displays the decoded frame (reduced screen) on the source window 362 as an index screen.

[0334] In addition, in the index screen, it is made here as [display / on the upper part / the identifier for identifying the index screen]. With the gestalt of operation of drawing 21 , Auto0, Index1, Auto2, Auto3, etc. are attached as an identifier of an index screen, for example.

[0335] Here, in the index screen corresponding to auto-index, that to which what gave the number to the alphabetic character of "Auto" gave the number to the index screen corresponding to a manual index at the alphabetic character of "Index" is attached as a default identifier, respectively.

[0336] Although auto-index is attached at the time of an image transcription as mentioned above, a manual index can be given to the location (however, limited to the head of GOP here) of the arbitration on the source window 362 by operating index addition carbon button 366A on the tool bar of the clip editor main window 362.

[0337] In addition, in the [index] menu of the clip editor main window 361,

modification] is in an item [manual index and it is made as [change / by clicking that / into a manual index / auto-index] (the identifier of an index screen is left intact in this case, for example (the alphabetic character of "Auto" is not set to "Index")). This change is made by changing the discernment flag which constitutes an index.

[0338] Moreover, in the clip editor main window 361, the index screen corresponding to auto-index and the index screen corresponding to a manual index are made as [display / by the color from which the amount of / of the identifier / display differs], and, thereby, are made as [distinguish / both / easily].

[0339] Furthermore, it is made as [delete / it / by operating deletion carbon button 366B which auto-index and a manual index have in the tool bar of the clip editor main window 361].

[0340] The time line 363 as a time-axis is displayed on the lower part of the source window 362. The left end is displayed that an index screen is in agreement with the location of the time of day (image transcription time of day of the index screen on the basis of the time of day when the image transcription was started) when it corresponds on the time line 363, for example.

[0341] An index screen is the frame of the beginning from which a scene

changes, therefore has become one scene from a certain index screen fundamentally till just before the next index screen. Therefore, a user can discover easily the scene for which it asks.

[0342] After an index screen is displayed, only the range which wants to carry out the check for a time-line 363 top is dragged with a mouse 22 to check an image. In this case, as that dragged range shows drawing 21 by R, it is shown, and let it be the playback range R. And if the playback carbon button 367 on the tool bar of the clip editor main window 361 is clicked for example, the playback range R will be reproduced.

[0343] That is, it is opened by the playback window 341 shown in drawing 15 in this case. And the MPEG system stream corresponding to the playback range R is decoded by MPEG1 software decoder 201A, and it is displayed on the image display column 342.

[0344] Therefore, a user can check a scene easily.

[0345] A user looks at an index screen, or checks a scene further, determines the scene used for edit, and clicks the editing point file creation carbon button 368 on the tool bar of the clip editor main window 361. In this case, as shown in drawing 21 , the output window 369 is displayed on the lower part of the source

window 362 in the clip editor main window 361.

[0346] A user drags the range to copy as a scene of a new clip in the source window 362 after the display of the output window 369. In this case, let from the index screen which is just before the range where it was dragged in the source window 362 to the frame in front of the index screen just behind that range be the range for a copy copied to a new clip. And on the time line 363 of the source window 362, starting point mark 364L and terminal point mark 364R are displayed on the location corresponding to the starting point and the terminal point of the range for a copy, respectively. Furthermore, a part for the background of the source window 362 corresponding to the range for a copy and the part of the time line 363 are changed into other colors.

[0347] If the cursor (not shown) of a mouse 22 is moved and a mouse 22 is dragged into the range for a copy in the location, cursor will be changed into a configuration which symbolizes an index screen for example, from an arrow-head configuration. And if cursor is moved to the output window 369 and a drag is canceled in the condition, the range for a copy will be copied to the output window 369. With the gestalt of operation of drawing 21 , one scene which uses as a head frame the index screen to which the identifier of "Auto0" was given,

and one scene which uses as a head frame the index screen to which the identifier of "Auto2" was given are copied to the output window 369.

[0348] In addition, if the range for a copy is copied to the output window 369, in the output window 369, all the auto-index in within the limits for [the] a copy is made as [delete]. Moreover, when auto-index is added to the head frame of the range for a copy, it is made as [change / into a manual index / the auto-index].

[0349] Here, deleting the auto-index in within the limits for [which was copied to the output window 369] a copy is based on the following reasons. That is, if it a "video-CD creator" creator [who is one of the application programs contained in "Slipclip" / who mentioned above] Depends, the video CD which recorded the scene copied to the output window 369 can be made. And as the "video CD creator", when making a video CD, it is made as [set / as the location of the scene change pointer recorded on the index file / the index in the specification of a video CD].

[0350] On the other hand, auto-index is for a user to tend to discover a desired scene, and, fundamentally, most number is recorded. Therefore, it is because the index of the number of such many will be set up on a video CD if auto-index is not deleted.

[0351] Moreover, changing the auto-index of the head frame of the range for a copy into a manual index is based on the following reasons. That is, as for the head frame of the range for a copy, it is desirable for it to be equivalent to the so-called editing point, and to set an index to an editing point also in a video CD. However, since auto-index will be deleted, it is for making it not deleted by changing into a manual index.

[0352] Therefore, in the output window 369, only the index screen corresponding to a manual index is displayed. For this reason, before performing the copy to the output window 369, as that auto-index was mentioned above, it is necessary to change it into a manual index to leave the index to the location of auto-index.

[0353] In addition, even if the range for a copy is copied to the output window 369, it is able to make it not to delete auto-index. Moreover, the auto-index of the head frame of the range for a copy can also be made not to change into a manual index.

[0354] A user copies the scene for which it asks in the output window 369 as mentioned above. Moreover, about the scene copied to the output window 369, it is made that the migration, deletion, rearrangement, etc. are possible, and such an activity is done if needed.

[0355] And when you wish to newly create the clip which consists of such scenes after arranging a desired scene in the output window 369 in order of a request, the build initiation carbon button 370 on the tool bar of the clip editor main window 361 is operated.

[0356] In this case, in a microprocessor 201, the coded data corresponding to each scene arranged in the output window 369 is read from an MPEG file, referring to an index file. And after required processing by the joint (editing point) is performed using the elementary data (elementary stream) of the read coded data as it is, only system encoding redoes. This encoding result is recorded on a hard disk 212 as a new MPEG file.

[0357] In addition, at this time, the index file (since this index file mentioned above, it consists of a manual index and auto-index is not contained) corresponding to the index screen currently displayed on the output window 369 is also newly created, and the MPEG file newly created with this is recorded on a hard disk 212 as a new clip.

[0358] Next, as mentioned above, the index screen corresponding to the auto-index recorded on the index file is displayed on the source window 362, but when many index screens are displayed, for example, without vacating spacing

so much, it becomes the hindrance of retrieval of the scene by the user on the contrary.

[0359] So, with the gestalt of this operation, certain conditions are established about the display of the index screen corresponding to the auto-index recorded on the index file, and it is made as [display / only the index screen corresponding to the condition (suitably henceforth a display condition)].

[0360] That is, drawing 22 shows the index display level-setting dialog box 381 for setting up a display condition.

[0361] In addition, for example, into the [display] menu of the clip editor main window 361 of drawing 21 , [index display level setting] occurs as an item, and the index display level-setting dialog box 381 is displayed by clicking that.

[0362] Altogether, the column 382 of a display is chosen, when setting up the display condition of displaying the index screen corresponding to all the auto-index recorded on the index file (click). The column 383 of level is chosen when setting up the display condition of displaying the index screen corresponding to the auto-index which has a scene change parameter beyond a certain threshold. A threshold is set as the value inputted into threshold input column 383A.

[0363] The individual numeral column 384 is chosen when setting up the display condition of displaying the index screen corresponding to the auto-index of a predetermined number on descending of a scene change parameter. A predetermined number is set as the value inputted into the number input column 385.

[0364] The maximum level display column 386 is chosen when setting up the display condition of displaying the index screen corresponding to the auto-index which has the greatest scene change parameter within the time amount for every time interval of a certain. A time interval is set as the value inputted into the time amount input column 387.

[0365] If either of the above display conditions is chosen, although it agrees with the total of the auto-index recorded on the index file in the display condition as which it was chosen of the auto-index, a number will be displayed on the column 388 of the total of several/index of the index displayed.

[0366] In addition, the O.K. carbon button 389 decides the setting matter in the index display level-setting dialog box 381 to that into which it was newly inputted, and when closing the index display level-setting dialog box 381, it is operated. Cancel button 390 holds the setting matter in the index display level-setting

dialog box 381 in the condition of having been decided last time, and when closing the index display level-setting dialog box 381, it is operated. A help button 391 is operated when displaying the help about the index display level-setting dialog box 381.

[0367] The display of the index screen in the source window 362 shown in drawing 21 is made as [carry / according to the display condition set up as mentioned above].

[0368] That is, as shown in the flow chart of drawing 23 , when judged with it being judged and chosen whether the column 382 of a display is chosen altogether, first, in step S61, it progresses to step S62, and the index screen corresponding to all the auto-index recorded on the index file is displayed on the source window 362, and ends processing.

[0369] Moreover, in step S61, when judged with the column 382 of a display not being chosen altogether, it progresses to step S63 and it is judged whether the column 383 of level is chosen. In step S63, when judged with the column 383 of level being chosen, it progresses to step S64, and what has a scene change parameter beyond the value inputted into threshold input column 383A among the auto-index recorded on the index file is searched, and it progresses to step

S68. At step S68, the index screen corresponding to the searched auto-index is displayed on the source window 362, and ends processing.

[0370] Moreover, in step S63, when judged with the column 383 of level not being chosen, it progresses to step S65 and it is judged whether the individual numeral column 384 is chosen. In step S65, when judged with the individual numeral column 384 being chosen, the auto-index which progresses and corresponds to step S66 is searched. That is, when setting to n the value inputted into the number input column 385, at step S66, from the auto-index recorded on the index file, n high orders with a large scene change parameter are searched, and it progresses to step S68. At step S68, the index screen corresponding to n searched auto-index is displayed on the source window 362, and ends processing.

[0371] When it is judged with the individual numeral column 384 not being chosen in step S65 on the other hand, Namely, neither of the column 382 of a display, the column 383 of level, and the individual numeral columns 384 is chosen altogether. Therefore, when the maximum level display column 386 is chosen, it progresses to step S67 and the auto-index which has the greatest scene change parameter [in each time amount] is searched from an index file

for every time interval set as the time amount input column 387. And in step S68, the index screen corresponding to the auto-index searched in each time amount is displayed on the source window 362, and ends processing.

[0372] As mentioned above, since the number of the index screens displayed can be restricted corresponding to the magnitude of a scene change parameter etc., a user becomes possible [discovering a desired scene easily].

[0373] With the gestalt of this operation here, when the column 383 of level is chosen, the value (threshold of a scene change parameter) inputted into threshold input column 383A is made as [change / it / by operating carbon button 365A on the tool bar of the clip editor main window 361 of drawing 21 to lower, and carbon button 365B to raise], even if it does not open the index display level dialog box 381. That is, whenever carbon button 365A to lower is operated, the number of the index screens which the threshold of a scene change parameter is made as [carry out / every / 1 / a decrement], therefore are displayed in this case will increase. Moreover, the number of the index screens which the threshold of a scene change parameter is made by that carbon button 365B to raise is operated as [carry out / every / 1 / an increment], therefore are displayed on it in this case will decrease.

[0374] In addition, although the index screen where a display is restricted according to the above display conditions is made only into the thing about auto-index, it can restrict similarly the display of the index screen corresponding to a manual index here.

[0375] Next, if a new clip is created and the number of clips increases by creating a clip (tape) in a "slip recorder", and editing the clip in a "clip editor", it will become difficult only by seeing a file name to, judge what is recorded on which clip for example. So, in "Slipclip", the "clip viewer" is prepared as an application program for managing a clip.

[0376] Starting of a "clip viewer" displays the clip viewer main main window 401 as shown in drawing 24 , for example.

[0377] The representation screen of the clip registered into the clip collection is displayed on the clip list 402.

[0378] Here, a clip collection is a folder for carrying out the group division of the clip, and a representation screen is a certain screen which constitutes a clip. Changing is also possible, although it is a default, for example, is made as [set / the screen of the beginning of a clip] in the representation screen.

[0379] The identifier given to the clip collection is displayed on tab 402A.

Therefore, with the gestalt of operation of drawing 24 , the folder as three clip collections, "the travel in summer", a "ski competition", and "Christmas", exists. In addition, a clip collection can be chosen by clicking tab 402A, and the representation screen of the clip registered into the selected clip collection is displayed on the clip list 402. The clip collection "the travel in summer" is chosen and the representation screen of three clips registered there is expressed to the clip list 402 as the gestalt of operation of drawing 24 .

[0380] When the representation screen displayed on the clip list 402 is clicked and a clip is chosen, the index screen of the selected clip is displayed on the index list 403.

[0381] The playback image of the clip chosen by the clip list 402 is displayed on the image display column 404. The title of the clip chosen by the clip list 402 is displayed on the title column 405. That is, in a "clip viewer", it is made as [attach / to a clip / a title], and the title is displayed on the title column 405.

[0382] An earth switch 406, the playback carbon button 407, a pause button 408, the skip carbon button 409,410, the index carbon button 411,412, the slider 414, the coma stepper button 415, and the slow playback carbon button 416 are equivalent to the earth switch 346 in the playback window 341 of drawing 15 ,

the playback carbon button 347, a pause button 348, the skip carbon button 349,350, the index carbon button 351,352, the slider 354, the coma stepper button 355, and the slow playback carbon button 356, respectively.

[0383] The full-screen carbon button 413 is operated when carrying out the full screen display of the image display column 404. The explanatory note of the clip with which the explanatory note column 417 was chosen by the clip list 402 is displayed. That is, in a "clip viewer", it is made as [attach / to a clip / an explanatory note], and the explanatory note is displayed on the explanatory note column 413.

[0384] In addition, although an image is encoded (compression) and it was made to record with the gestalt of this operation, this invention can be applied, without encoding an image, also when recording as it is. However, it depends on the amount of data [whether slip playback can be performed] (data rate) of the image data recorded on videotape in the transfer rate of a hard disk 212 and the head seek time, and a list.

[0385] That is, for example, 4Mbps(es) or 20ms are now considered, respectively like an above-mentioned case as the transfer rate or the head seek time of a hard disk 212.

[0386] And supposing the image as the case in image transcription mode "Normal" with the same amount of data of one frame, i.e., the amount of data of 15 frames, performs the record and playback for 1856KB of image mentioned above, the writing of 1856KB of data to a hard disk 212 and read-out will take the time amount for about 453ms (= 1856 [KB] / 4x1024 [KB/s]), respectively. If 20ms which is the head seek time is taken into consideration to this, writing or read-out will all take the time amount for about 473ms. Therefore, between the time amount equivalent to 15 frames, i.e., about 0.5 seconds, in order to write the image data of 15 frames to juxtaposition in this case, the time amount for about 946ms (=473ms+473ms) will be taken, and it can carry out.

[0387] On the other hand, supposing the image as the case in image transcription mode "Long" with the same amount of data of one frame, i.e., the amount of data of 15 frames, performs the record and playback for 394KB of image mentioned above, the writing of 394KB of data to a hard disk 212 and read-out will take the time amount for about 96.2ms (= 394 [KB] / 4x1024 [KB/s]), respectively. If 20ms which is the head seek time is taken into consideration to this, writing or read-out will all take the time amount for about 116.2ms. Therefore, between the time amount equivalent to 15 frames, i.e., about 0.5

seconds, since R/W of the image data of 15 frames is ended in about 232.4ms (=116.2ms+116.2ms) in this case, that R/W can be performed to juxtaposition.

[0388] Moreover, although the image was encoded with the gestalt of this operation based on the specification of MPEG1 which is one of the coding approaches in a fixed rate, the coding approach of an image is not limited to the thing based on the specification of MPEG1, and it is also possible to encode an image at an adjustable rate. However, when encoding an image at an adjustable rate, when performing slip playback, it becomes difficult to detect the location where the coded data is recorded from the byte count from the recording start location, for example.

[0389] Moreover, although it was made to perform slip playback with the gestalt of this operation for the image (and voice which accompanies it), it is also possible to perform slip playback for other data. Similarly reservation of a tape can also be carried out for an image or data other than voice.

[0390]

[Effect of the Invention] According to a record regenerative apparatus according to claim 1 and the record playback approach according to claim 10, the information already recorded on that information is recorded on an information

record medium and coincidence by the information record medium is reproduced from the location of arbitration. Moreover, the program for making the processing which reproduces the information already recorded on the information record medium from the location of arbitration perform to a computer is recorded on recording information on an information record medium, and coincidence by the record medium according to claim 11. Therefore, it becomes possible to check already recorded information, without interrupting record.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing the example of an appearance configuration of the personal computer which applied this invention.

[Drawing 2] It is the perspective view showing the example of an appearance configuration of the personal computer which applied this invention.

[Drawing 3] It is the front view of a body 31.

[Drawing 4] It is the rear view of a body 31.

[Drawing 5] It is the block diagram showing the example of an electric configuration of the personal computer of drawing 1 (drawing 2).

[Drawing 6] It is the block diagram showing the example of a configuration of the MPEG1 real-time encoder board 213.

[Drawing 7] It is drawing showing the slip recorder main window 301.

[Drawing 8] It is drawing showing the tape setting dialog box 321.

[Drawing 9] It is drawing for explaining a normal tape and an endless tape.

[Drawing 10] It is drawing for explaining the specification in each image transcription mode.

[Drawing 11] It is a flow chart for explaining the image transcription processing for a normal tape.

[Drawing 12] It is a flow chart for explaining the image transcription processing for an endless tape.

[Drawing 13] It is a flow chart for explaining index record processing.

[Drawing 14] It is drawing showing a format of index data.

[Drawing 15] It is drawing showing the playback window 341.

[Drawing 16] It is drawing for explaining elapsed time, residual time, and image transcription time of day.

[Drawing 17] It is a flow chart for explaining slip regeneration.

[Drawing 18] It is a block diagram for explaining processing of an application program "a slip recorder."

[Drawing 19] It is drawing showing time amount change of a scene change parameter.

[Drawing 20] It is a flow chart for explaining processing of a controller 133.

[Drawing 21] It is drawing showing the clip editor main window 361.

[Drawing 22] It is drawing showing the index display level-setting dialog box 381.

[Drawing 23] It is a flow chart for explaining the index screen-display processing which displays an index screen on the source window 362.

[Drawing 24] It is drawing showing the clip viewer main window 401.

[Description of Notations]

21 Keyboard 22 Mouse, 24 Microphone 31 Body 32 and 33 side 34 Power button 35 crevice 36 Under panel The top of the panel of 37, 41 FDD 42 CD drive, 43 AV terminal area 44 An extension, 45 Guide 51 A display, 52 Plinth 53 displays 54 crevice 55 CRT 56 and 57 side 58 Slot 59 60 A loudspeaker, 61 Line indicator 63 Hard disk access indicator light 64 Floppy disk drive access indicator light 66 Floppy disk eject button 68 Eject button 69 ejection hole and 70 An access indicator light, 71 Power-source input terminal 72 A keyboard terminal and 73 mouse terminal, 74 USB terminal 75 printer terminal, 76 A serial terminal, 77 Game terminal 78 A headphone terminal, 79 Rhine input terminal 80 A microphone terminal, 81 Image output terminal 82 S image output terminal, 83 Monitor terminal 84 AV terminal area, 85 An antenna terminal, 86 The Rhine jack, 87 Telephone jack 101 input terminal, 102 Output terminal 110 frame memory 111 A block divider and 112 -- difference -- vessel 113 a change-over

switch -- 114 DCT circuit 115 quantizers, 116 Zigzag scan circuit 117 VLC circuit, 118 An output buffer, 119 Quantization step controller 120 motion detector, 121 Motion compensation machine 122 frame memory 123 A change-over switch and 124 adder 125 A reverse DCT circuit, 126 Reverse quantizer A 130 image weighting network, 131 Scene change detector 132 compression approach selection circuitry 133 A controller, 201 Microprocessor 202 main memory 203 VRAM, 204 Bus bridge 206 modems, 207 I/O interface 210 secondary memory interface, 211 A CD-R disk, 212 Hard disk 213 A MPEG1 real-time encoder board, 213A TV tuner, 214 A video camera, 215 AV processing circuit 215A NTSC encoder 216VTR, 301 The slip recorder main window, 302 Image transcription indicator 303 scene change indicator 304 current time display 305 An image transcription time amount display, 306 A timer standby indicator and 307A endless image transcription display 307B An input source display, 308 Earth switch 309 An image transcription carbon button, 310 Pause carbon button 311 Image transcription time amount display modification carbon button 312 Input change-over carbon button 313 Up-and-down carbon button 314 A channel carbon button, 321 A tape setting dialog box, Column of 322 identifier 323 Write-protected check box 324 The column of a class, 325 Column of image

transcription time amount 326 Auto-index check box 327 The column in image transcription mode, 328 The column in sound recording mode, 329 Automatic check box 330 reference carbon button 331 An informational column, 332 The O.K. carbon button, 333 A Cancel button, 334 Help button 341 A playback window, 342 The image display column 343 A playback indicator, 344 A playback time amount display, 345 A voice mode display, 346 Earth switch 347 A playback carbon button, 348 Pause button 349,350 skip carbon button 351,352 Index carbon button 353 Playback time amount display modification carbon button 354 Slider 354A slider slot 355 Coma stepper button A 356 slow playback carbon button, 357 Voice change-over carbon button 361 clip editor main main window, 362 Source window 363 time line 364L A starting point mark, 364R Terminal point mark 365A Carbon button to lower 365B The carbon button to raise, 366A An index addition carbon button, 366B Deletion carbon button 367 A playback carbon button, 368 An editing point file creation carbon button, 369 Output window 370 build initiation carbon button 381 Index display level-setting dialog box 382 It is the column of a display, and 383 altogether. Column of level 383A Threshold input column 383A 384 The individual numeral column 385 number input column 386 The maximum level display column, 387 The time

amount input column 388 Column of the total of several/index of the index displayed 389O.K. carbon button 390 Cancel button 391 Help button 401 The clip viewer main main window, 402 Clip list 402A tab 403 An index list, 404 The image display column The 405-title column, 406 Earth switch 407 A playback carbon button, 408 Pause button 409,410 skip carbon button 411,412 Index carbon button 413 Full-screen carbon button 414 Slider 415 Coma stepper button 416 Slow playback carbon button 417 The explanatory note column